

JUROR MANAGEMENT IN THE UNITED STATES  
DISTRICT COURTS

By

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A DISSERTATION PRESENTED TO THE GRADUATE COUNCIL  
OF THE UNIVERSITY OF FLORIDA IN PARTIAL FULFILLMENT  
OF THE REQUIREMENTS FOR THE DEGREE OF  
DOCTOR OF PHILOSOPHY

UNIVERSITY OF FLORIDA  
1972

## ACKNOWLEDGMENTS

Many individuals have greatly assisted in the preparation of this study. I acknowledge their help with sincere appreciation.

I am especially grateful to Professor William V. Wilmot, Jr., Chairman of the dissertation committee, for his constructive criticism and professional advice. Professor Wilmot provided prompt and helpful comments and assistance in the development of the research design and in writing of the dissertation.

I am especially indebted to Professor Warren Menke, co-chairman of the dissertation committee, for his constructive criticism and assistance particularly during the formation of the research design.

I am deeply grateful to Professors John McFerrin, Ralph Blodgett, Jordon Ray, and Elmo Jackson for their discerning commentary as well as continued encouragement.

Mrs. Maureen Solomon of the Institute of Court Management, Denver, Colorado, has helped me to avoid many of the pitfalls which were inevitable. I would also like to thank Judge Ben Krentzman, Federal District Judge for the Middle District of Florida, for making the records of his courts available to me.

Despite the help and support which these individuals provided, I am, of course, responsible for the errors of omission or commission in this dissertation.

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Abstract of Dissertation Presented to the  
Graduate Council of the University of Florida in Partial  
Fulfillment of the Requirements for the Degree of Doctor of Philosophy

JUROR MANAGEMENT IN THE UNITED STATES  
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By

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December, 1972

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Major Department: Management

This study had as its major objective the examination of the applicability of modifications in the juror management systems currently used in some Federal District Courts. Possible modifications were examined because of assertions, both pro and con, that the juror management system could be improved.

While a literature search revealed the existence of a few descriptive studies, there has been very little analytical research in this subject. The analytical research has been primarily confined to

- (1) the effects on the juror's attitudes when he is not utilized and
- (2) an attempt to forecast the peak requirement for jurors.

This dissertation asserted that the number of jurors summoned could be reduced and the court would still have enough jurors to hear its cases with few or no delays. This study suggests two specific

ways that this can be accomplished. First, each court needs to gather necessary data to forecast its demand for jurors. The number of jurors it summons can then be matched to these requirements. Second, a change from the jury pool method to a multiple voir dire approach could increase the utilization of jurors and decrease the demand for jurors.

This investigation concerned itself with the analysis of the relationship between certain observable factors in the court system and the court's juror utilization. The second primary objective was to build a simulation model which could be used to observe the effects of proposed changes in the juror management system.

The dependent variables used were the Juror Utilization Index and the percentage of unused jurors. The independent variables used were those selected from the Court Management Statistics and those gathered by questionnaire.

Correlation analysis was used to arrive at the conclusion that there is no relationship between juror utilization and the rate of trial production. This conclusion indicates that increased juror utilization may be achieved without significantly affecting the ability of the court to hear cases.

The effectiveness of the forecasting approach used to determine the juror call-in for one large district was analyzed. Analysis of the Z scores associated with the number of unused jurors showed that it was possible to reduce significantly the number of jurors called-in and still have enough jurors available to try each of the cases before the court without delay.

A simulation model of a typical four judge district court utilizing a juror pool was constructed. After the model was constructed



and run, it was modified to test the effects of a change to a "multiple voir dire" approach. The result of this change was an increase in the average juror utilization from 51.3 percent to 97.1 percent. This indicated that utilization of jurors could be improved by the use of a multiple voir dire approach to juror management. Additionally, the usefulness of a simulation model to test the effectiveness of proposed changes in a court system was demonstrated.

This same conclusion regarding the effectiveness of the "multiple voir dire" approach was indicated as a result of a test of independence of principles of classification. Questionnaire data and the Court Management Statistics were used for the test.

Similar tests were used to determine: (1) the disposition of unused jurors did not influence juror utilization, and (2) variability in the number of jurors summoned for a trial docket did not influence juror utilization.

The research supported the major hypothesis that the number of jurors summoned could be reduced and the court would still have enough jurors present to hear the cases that are called.

## CHAPTER I

### INTRODUCTION

This study is concerned with the jury system in the federal courts in the United States. The primary purposes of this study are three-fold: (1) to examine the relationship between juror utilization and trial production; (2) to examine the effectiveness of the method used in some courts to forecast the desirable size of the jury call; and (3) to analyze specific relationships among juror utilization, caseloads, and controllable court practices. The secondary purposes of this study are two-fold: (1) to build a simulation model of a "typical" court and test the effectiveness of a change in the juror management approach which resulted from the comparative analysis; and (2) to formulate recommendations for further development of this simulation model.

The practice in some United States District Courts has been to call in more jurors than necessary. The courts could benefit from an attempt to forecast more accurately their needs for jurors. There is a general attitude that it is better to pay many extra jurors to sit and wait rather than to allow the possibility that a judge might call for a panel and not receive it immediately. This study questions this practice.

The implementation of a system which forecasts juror needs combined with the adoption of a more effective juror management approach

will enable the court to make better use of its resources. This proposition is examined by analyzing some newly gathered data plus existing data to compare variables which can be used to forecast the need for jurors. The effects of a forecasting system and alternative means of juror management on the need for jurors and juror utilization are identified.

An inefficient juror management system results in excessive costs because of jury calls which are larger than necessary. These costs include the administrative expenses associated with calling an excessive number of jurors in addition to the direct payments to jurors who are not used. Additionally, there are certain social costs associated with an excessive jury call. These costs will be considered further in this chapter and in Chapter II.

Possible relationships among the demand for jurors and such factors as whether a case is widely publicized, whether the defendant has a prior conviction, the type of case involved, the judge hearing the case, and the court's utilization of the jurors it calls are discussed in Chapter VI. The dependent variable is the demand for jurors. The independent variables are first, those factors which affect the number of peremptory challenges and challenges for cause and second, those factors which affect the number of panels required. These factors include: postponements, waivers of juries, settlement and guilty pleas, and the system of jury management used.

This study is useful because the analysis which is developed is applicable to other courts. In addition, it is the first systematic comparative analysis of the complicated problem of juror utilization.

### Background of the Problem

To most citizens of the United States, the right to trial by jury is unquestioned. This tradition can be traced back to the Magna Carta. The British system of juries was carried over to the colonies and the principle was incorporated into the Constitution of the United States. The Constitution of the United States "preserves" the right to trial by jury in civil cases.<sup>1</sup> Additionally, the Constitution says that the accused "shall enjoy the right" of jury trial in criminal cases.<sup>2</sup> However, contrary to widespread popular belief, trial by jury is not available to the criminal defendant as a matter of fact in all situations.<sup>3</sup>

The right to trial by jury is found in the sixth and seventh amendments of the Federal Constitution. The Supreme Court has held that these provisions of the Constitution apply only in the federal court.<sup>4</sup> However, every state constitution contains a provision guaranteeing jury trial in the state court.<sup>5</sup> The state and federal constitutional provisions merely "preserve" the right, but do not create it. The scope and extent of the right to trial is limited, therefore, to the right as it existed at the time the constitutional provisions were written. The legal system adopted by the United States was based upon the law of England as it existed in 1787. Under the English system, the right to jury trial in civil cases extended only to "action at law"

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<sup>1</sup>U. S. Const. Amend. VII.

<sup>2</sup>U. S. Const. Amend. VI.

<sup>3</sup>See Bloom v. Illinois, 391 U. S. 194 (1968) or Duncan v. Louisiana, 391 U. S. 145 (1968).

<sup>4</sup>Justices v. Murray, 76 U. S. 274 (1869).

<sup>5</sup>Milton D. Green, The Courts, The Public, and The Law Explosion. (Englewood Cliffs, N. J.: Prentice-Hall, Inc., 1965), p. 23.

(where the relief sought was commonly in order in telling the defendant to do or refrain from doing an act).<sup>6</sup> Common law always recognized a wide range of petty offenses which were tried summarily before a magistrate without the interposition of a jury.<sup>7</sup>

The desirability of the right to trial by jury can be debated. Abolishing the federal jury right would require a constitutional amendment. This possibility has been suggested by representative Emanuel Celler (D-N.Y.), Chairman of the House Judiciary Committee. Representative Celler has been cited in Business Week as saying that the right to speedy trial may take precedence over the jury right and that his committee possibly will "consider a constitutional amendment to curtail or even abandon jury trial in some cases."<sup>8</sup>

While there is debate as to the desirability of the jury system, the elimination of the jury trial is not a subject of this dissertation. Appendix A contains a synopsis of the arguments pro and con the jury system. This dissertation deals with research into jury utilization within the current legal framework.

#### Changes in the Jury System

"The right to be judged by peers rather than an established judge or precept was intended to make the development of the law responsive to the mores of the community."<sup>9</sup> This is contrasted to trial by a judge, the serious and significant alternative.

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<sup>6</sup>Ibid.

<sup>7</sup> Harry Kalven, Jr., and Hans Seisel, The American Jury. (Boston: Little, Brown, and Company, 1966), p. 15.

<sup>8</sup>"The Push to Streamline the Court," Business Week, December 4, 1971, pp. 46-47.

<sup>9</sup>William T. Pabst, Jr., A Study of Juror Utilization. (Washington: Condensation of the report prepared under a LEAA, U. S. Department of Justice Grant, 1971), p. 2.

Jurors were once selected for their knowledge of the facts. In current practice, however, anyone who has knowledge of the facts involved in a case is rejected from serving on the jury which will try the case. In 1968, the United States Congress passed the Jury Selection and Service Act.<sup>10</sup> This law introduced the requirement that a jury be drawn from a cross section of the community. This random selection of jurors eliminated a long prevailing practice previously perpetrated by the view that a "Blue Ribbon" jury was desirable.<sup>11</sup> "Impartiality is the principle feature of the modern jury. The list from which the jurors are drawn must be unbiased. Jurors must be ignorant of any of the facts in the case to be tried. Any acquaintance with the participants in the trial - either parties, lawyers, or witnesses, is disqualifying."<sup>12</sup>

Other suggestions for changes in the jury system have been made. One suggestion is that the requirement for unanimous decisions be changed to a majority decision. The pressure to substitute majority for unanimous decisions comes from the desire to avoid retrials caused by hung juries. Justice William Rehnquist of the Supreme Court has suggested that convictions might be handed down by nine jurors of the traditional twelve.<sup>13</sup> The British system, from which the United States has patterned many of its laws, recently removed the requirement that

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<sup>10</sup>Jury Selection and Service Act of 1968, 82 Stat. 53 (1968).

<sup>11</sup>Ernest P. Friesen, Jr., et. al., Managing the Courts. (Indianapolis: Bobbs-Merrill Company, 1971), p. 50.

<sup>12</sup>Ibid.

<sup>13</sup>"The Push to Streamline the Courts," Business Week, December 4, 1971, pp. 46-47.

a jury be unanimous in criminal cases. "The reason for this, as reported in the press, was to prevent improper influence by a small minority of the jury."<sup>14</sup> The United States Supreme Court has recently ruled that a jury's decision need not be unanimous in some cases.<sup>15</sup>

Another significant change which has occurred in the United States recently has to do with the size of the jury. The U. S. Supreme Court ruled in June, 1970 that the jury need not be composed of twelve individuals.<sup>16</sup> The court upheld the legality of trials where less than twelve individuals were on the jury. Recently, several courts have started to hear cases with six-man juries. As of September 1, 1970, 29 of the 93 U. S. district courts have adopted rules reducing the size of the juries in civil cases.<sup>17</sup>

The desirability of the six-man jury is also out of the scope and intent of this research. These issues are matters of law and/or court adopted procedural rules. This dissertation deals with research into juror utilization within the current legal framework.

#### Description of the Federal Court System

The jurisdiction of the federal courts is limited. In theory at least, the federal government is a government of limited powers. It has only the powers which the states have ceded to it and which are spelled out in the Constitution, expressly or by necessary implication.

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<sup>14</sup>Friesen, *op. cit.*, p. 50.

<sup>15</sup>Apodaca v. Oregon, U. S. Supreme Court, May 22, 1972, Volume 40, United States Law Week, p. 4528.

<sup>16</sup>Williams v. Florida, 399 U. S. 78 (1970).

<sup>17</sup>"Juror Utilization," a report prepared by the Division of Procedural Studies and Statistics...Administrative Office of the United States Courts, August 13, 1971.

The judicial power of the United States is defined by Article III and is confined to three types of cases:

(1) those which involve a question of federal law, and this includes the Constitution, statutes, and treaties; (2) cases of admiralty and maritime jurisdiction; and (3) controversies involving certain categories of parties.

The latter parties include:

(A) ambassadors and public ministers, (B) the United States, (C) a state, (D) citizens of different states, (E) foreign states or citizens thereof.<sup>18</sup>

This is the sum total of the judicial power of the United States and is a limitation upon the jurisdictions of all federal courts.

In actual practice the cases which find their way in and out of federal courts are usually of three kinds and are about equally distributed. They are (1) cases in which the United States is a party, (2) civil cases involving a federal question, and (3) civil cases involving diversity of citizenship of the parties. In the first category are civil as well as criminal cases, but the latter are very numerous since the federal courts have exclusive jurisdiction in enforcing the federal criminal laws. Falling within the last two categories are most of the civil cases. In the district court, in each of the classes of cases, a minimum amount of \$10,000 (exclusive of interest and costs) must be involved before a case is eligible to be brought into the district court.<sup>19</sup>

Article III of the Constitution vests the judicial power of the United States in "one Supreme Court and in such inferior courts as

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<sup>18</sup>U. S. Const. Art. III, Sec. 2.

<sup>19</sup>Green, op. cit., pp. 11-12.



the Congress may, from time to time, ordain and establish." Under this grant of power, Congress has created a simple three-deck hierarchy which in order of ascendance, consists of: the district courts, the courts of appeal, and the Supreme Court.<sup>20</sup> The district court exercises original jurisdiction in most cases which go to the federal courts. The United States covers a large area which must be subdivided for purposes of efficient judicial administration. Accordingly, Congress has divided it into districts and has established a district court for each of these. It seemed desirable to follow state lines as much as possible. Hence, approximately half of the states have been assigned but one federal district court each. Thus, there is the United States District Court for the District of Alaska, the United States District Court for the District of Colorado, and so on. However, some states are so populous with such a volume of judicial business that one court could not handle it. In such cases, the state has been subdivided into two, three, and even four districts with a corresponding number of district courts.<sup>21</sup>

The Federal Court System is highly diffused for management purposes. Administrative authority settles at two spots: (1) in the intermediate court of appeals, acting as circuit councils, and (2) in the district courts.<sup>22</sup> The degree of this authority is limited. In the case of the circuit councils, the authority is limited by the United States Code.<sup>23</sup> The administrative authority of the district

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<sup>20</sup>Ibid., p. 9.

<sup>21</sup>Ibid.

<sup>22</sup>Friesen, op. cit., p. 33.

<sup>23</sup>U. S. Code, Title 28, Chapter 15, Section 332, Amended 1971.

court is limited by the judicial conference of the United States.<sup>24</sup>

Each circuit court of appeals has a circuit council. Each circuit (judicial) council is composed of all of the circuit judges of that particular circuit court of appeals. The council is headed by the chief judge of the circuit. The United States Code provides that "each judicial council shall make all necessary orders for the effective and expeditious administration of the business of the court within its circuit."<sup>25</sup> Each judicial council has the authority to appoint a circuit executive. The circuit executive's duties may include the responsibility for administering a personnel system for the circuit and administering the budget for the circuit. His responsibilities need not be limited to these however.<sup>26</sup>

This district courts under limitations prescribed by the judicial conference may manage their supporting personnel. The district judges appoint their magistrates and referees. These two groups, under the direct supervision of the district judges, have the strongest possible authority to manage. They rarely exercise it.<sup>27</sup>

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<sup>24</sup>The judicial conference of the United States is a policy board for the Federal Court System. The conference is composed of the chief judge of each of the eleven circuits. The group also includes the chief judges of the special United States courts and an elected trial court judge from each circuit. The conference functions under the chairmanship of the Chief Justice of the United States. The functions, composition, and limitation of the conference are defined in U. S. Code, Title 28, Chapter 15, Section 331.

<sup>25</sup>United States Code, Title 28, Chapter 15, Section 332, Subsection D, Amended 1971.

<sup>26</sup>United States Code, Title 28, Chapter 15, Section 332, Subsection E, Amended 1971.

<sup>27</sup>Friesen, op. cit., p. 33.

The judicial conference of the United States has the power to monitor and, in some cases, to direct the activities of the Administrative Office of the United States Courts. The Administrative Office functions as staff to the judicial conference. Its primary role is as a coordinating agency to mesh the federal court system with the budgetary and fiscal processes of the central government.<sup>28</sup> The Administrative Office has the authority to allocate supporting personnel and to administer a salary system.<sup>29</sup>

The bulk of the staff of the Administrative Office are engaged in either service or routine monitoring activities. Consequently, the staff does not perform comprehensive management functions for the federal courts.<sup>30</sup>

#### Definition of Terms

Certain legal terms have meanings which may not be obvious. In order to clarify these, the following glossary is presented:<sup>31</sup>

A "voir dire" is the process in which prospective jurors are questioned to ascertain their suitability for service on a jury. It is conducted by the judge and the lawyers, usually in the courtroom just prior to the start of a trial.

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<sup>28</sup> Ibid.

<sup>29</sup> Ibid.

<sup>30</sup> Ibid., p. 34.

<sup>31</sup> Adapted from "Suggestions for Improving Juror Utilization in the United States District Court for the Eastern District of New York," (New York: The Institute of Judicial Administration, prepared under a grant from The Federal Judicial Center, 1971), p. 2. Also William A. Stoeber, "Suggestions for Improving Juror Utilization in the United States District Court for the Southern District of New York," (New York: The Institute of Judicial Administration, prepared under a grant from The Federal Judicial Center, 1971), pp. 5-6.

"Juror" refers to any person who has been called in for jury service, whether actually sitting on a case or waiting in a jury lounge to be sent to a voir dire. Occasionally, the term "prospective juror" is used to mean the same thing. The proper term might actually be "venireman" but this term is not in common usage in the courthouse.

"Juror-Day" refers to the presence of one juror in the courthouse for one day. A "Juror-day of availability" means that at the start of a day the juror was in the juror lounge available to be sent to a voir dire.

"Called in" means that the prospective juror has been told to report into the juror lounge in order to be available for voir dire if needed.

"Panel" refers to the group of prospective jurors sent from the jury lounge to attend a voir dire.

A "petit jury" is a group of jurors (customarily 12) who are actually hearing evidence or deliberating in a trial. A "grand jury" (containing up to 23 members) hears evidence from the government prosecutor and decides whether the evidence is sufficient to indict or prosecute a person for an alleged crime.

"Request" refers to a call from a judge on the morning or afternoon of a trial that the judge is then ready to begin a voir dire and wants a panel to be sent to his courtroom.

"Used" has two different meanings, depending on the context. When referring to the appropriate call-in for a given day, it means the number of jurors who have been sent from the jury lounge to attend a voir dire. When referring to the appropriate sizes of panels to send to voir dire, it means the number who have been selected to serve on a jury, or excused, or challenged during the course of a voir dire.

"Jury" refers to a group of jurors (customarily 12) who have been selected in a voir dire and are actually sitting on a case.

"Order" refers to a statement by a judge or his "courtroom deputy" to the jury clerk that the judge may need a panel of jurors on the following day.

"Courtroom Deputy" includes "court clerk" or any other person on a judge's staff who communicates with the jury clerk.

"Jury Clerk" includes any member of the jury staff responsible for supplying jurors to the court. This responsibility includes the administrative work necessary for the jury selection process.

#### Definition of Juror Utilization

It has been suggested that a juror is being utilized only when he is actually hearing a case in court or deliberating on a verdict for the trial. The definition used in this dissertation is broader however.

In this research a juror is defined as being utilized: (1) when he is part of a panel taking part in a voir dire, (2) when he is acting as a juror, sitting through a trial, (3) when he is acting as a juror attempting to reach a verdict, and (4) when he is required to be present for a case for reasons such as sentencing, hearings in chambers, and the reading of the verdict.

#### Problem Statement

This study involves two problems. The first problem is to determine whether the federal district courts are using jurors in "optimal" manner. That is, does the juror management system used by some courts in the federal district court system represent an optimal configuration. The second problem examined results from the findings of the first part. This second problem is the formulation of a normative model which can be used to improve the effectiveness of the juror management system.

A secondary problem is the formulation of a simulation model which will permit an analysis of the effects of changes in the court's juror management approach. Additionally, recommendations concerning the further development of the simulation model are made.

### Need for Solution

The Judicial Conference Committee on the Operation of the Jury System has expressed the opinion that economies could be effected in the federal courts through more accurately predicting the number of jurors needed. In a 1960 report, the chairman of the committee, Judge Irving Kauffman, said,

The Committee believes that there is avoidable waste in the administration of the jury system in some courts. However, the figures of jury cost and use of petit jurors is not alone enough to enable it to point out the individual instances where economies can be made and more efficient use of jurors can be brought about. What is needed are field studies -- of individual districts to show how the administration of the jury system is handled in individual instances.<sup>32</sup>

In one of the very few studies done concerning jury utilization in the federal courts, the researchers concluded:

The observations and statistics assembled during this preliminary study do not justify an unequivocal statement that the courts are calling too many jurors each month, but do indicate a strong likelihood in some cases. The high number of jurors on call, the number of unused jurors, and the high juror costs per jury trial indicate that most of the courts could reduce the number of jurors called and save money and alleviate the clerical workload.<sup>33</sup>

The significance of this statement is emphasized because of three advantages which would almost certainly occur from better juror utilization.

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<sup>32</sup>"The Jury System in the Federal Courts," Judicial Conference of the United States, 1960, p. 87.

<sup>33</sup>"Survey of Juror Selection and Management Systems in the Federal Courts." A report undertaken at the request of the Federal Judicial Center by the Public Systems Management Services Organization of Westinghouse Electric Corporation, 1970.

First, if the number of unused jurors were reduced, the amount of money paid out by the courts to the jurors would be reduced. (By law, each juror is paid \$20 for each day for which he is called for juror service.)<sup>34</sup> The cost of this under-utilization includes the direct payment to the jurors for idle hours which they spend waiting to be assigned to a jury panel. For fiscal year 1971, fees paid to jurors in the U. S. district courts were \$16,030,000.<sup>35</sup>

Additionally, there is the cost of meals for the jurors and, in many situations, the jurors are reimbursed for travel to the court on days when they are not utilized. In addition, because of the additional number of potential jurors that must be selected randomly, questioned, summoned, and otherwise processed due to the lack of utilization, the administrative expenses associated with jury selection are increased. The cost of providing security for the jurors whether used or not must also be considered.

In addition to these explicit costs, there are implicit social costs associated with the unproductivity of the individual during the idle hours spent waiting to be assigned to a panel.

Second, as the amount of time the individual juror spends waiting to hear a case decreases, his experience with the jury process becomes more meaningful and worthwhile.<sup>36</sup> People who seek to be excused from jury service might be more willing to serve if they felt

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<sup>34</sup>Jury Selection and Service Act of 1968, 82 Stat. 62 (1968).

<sup>35</sup>Annual Report of the Director of the Administrative Office of the United States Courts, 1971 (Washington D.C.: G.P.O.), p. 207.

<sup>36</sup>Westinghouse, op. cit., p. 3.

they were better utilized. It follows, therefore, that better utilization might improve the quality of jurors participating in the jury process.<sup>37</sup>

Third, many people feel that there is a crisis of confidence in the court. Without establishing or arguing the degree of this lack of confidence, people agree that this problem exists to some degree. This situation can only be aggravated by inefficient and ineffective jury management systems.<sup>38</sup>

#### General Hypotheses

The major hypothesis of this research is: the number of jurors summoned could be reduced and the court would still have enough jurors present to hear the cases that are called. For analysis, the major hypothesis is divided into three working hypotheses.

They are as follow:

- (1) There is a correlation between the percentage of unused jurors and the rate of trial production.
- (2) The number of jurors summoned represents the best estimate of the need for jurors.
- (3) A simulation model can be developed which provides a basis for the testing of proposed changes in the juror management system of the Federal District Courts.

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<sup>37</sup>Pabst, op. cit., p. 9.

<sup>38</sup>See comments in recent general publications relating to efficiency in the jury system: "Twelve Missing Men," Newsweek, June 10, 1968, p. 58; Zinsser, "In the Universal Waiting Room," Life, May 1968, p. 18B; Wainright, "A Legal Miscarriage of Justice," Life, December 3, 1965, p. 3D; "Coming Crises in the Courts," U. S. News and World Report, May 4, 1968, p. 44; James, "Time for Jury System Reform?" Christian Science Monitor, June 28, 1967, SCC. II, p. 1; "Case of the Waiting Juror," New York Times, December 5, 1968, SCC. II, p. 1.



### Methodology

Some of the data were gathered by interviewing officials in the Federal District Court for the Middle District of Florida. Other data and statistics were obtained from (1) the Administrative Office of the United States Courts, (2) recent studies of particular Federal District Courts, and (3) the questionnaire sent to each of the 93 Federal District Courts. A detailed description of the methodology is presented in Chapters II and III.

### General Approach to the Problem

This research has five parts.

- (1) A statistical summary of data concerning the operation of each of the 93 United States Federal District Courts was acquired.<sup>39</sup> This data included information on juror utilization. A questionnaire seeking additional information was designed and sent to each of the divisions of each of the district courts.
- (2) A comparative analysis was made of the data contained in the Court Management Statistics<sup>40</sup> and on the questionnaires returned.
- (3) As a result of the comparative analysis, additional data and reports were gathered on the United States District Court for the Western District of Michigan and the Southern District of New York.

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<sup>39</sup>"Management Statistics for United States Courts," a report to the Chief Justice of the United States, the Chairmen and members of the Judicial Councils of the Circuits, and the Chief Judges and Judges of the United States District Courts by the Director of the Administrative Office of the United States Courts, February, 1972.

<sup>40</sup>Ibid.

- (4) A simulation model of a "typical" court was built using data acquired as a result of the literature search. A specific modification in the court system was suggested as a result of the analysis of the data gathered in (3) previously. The effects of this change on the court simulation were investigated.
- (5) Guidelines for future development of the model were developed.

#### Scope and Limitation

This study deals with the United States District Court System in general. Specifically, the Southern District of New York and the Western District of Michigan were chosen for closer analysis. The statistics used to make comparisons were derived from basically three sources: (1) those accumulated for the Administrative Office of the United States Courts, and (2) data gathered by the use of a questionnaire sent to each of the 93 Federal District Courts, and (3) data gathered from previous studies. The statistics were limited to those listed for reasons to be discussed in Chapter II.

The simulation model which was constructed represents a court which has four judges actively hearing cases. This simulation model was used to test the effectiveness of a particular "hypothetical" change in the court's method of operation. This change involved the use of the "multiple voir dire" as compared to the more conventional "jury pool" approach. No other changes in the court system were investigated by use of the simulation model. This methodology could, however, be used to test other proposed changes.

There is an implicit assumption throughout this dissertation that jurors can be utilized more fully and this would not diminish the quality of justice. Basically, this amounts to an assumption that given no other information, one hour of a juror's service is as good as an hour of another juror's service.

### Organization of the Study

This chapter presented the background of the study. Chapter II describes the development of the model used in this study. It includes the results of the literature search along with a description of the models used to test the hypotheses. Additionally, Chapter II describes the source of the empirical data used for testing the models. Chapter III has as its purpose the empirical testing of Hypothesis (1) and (2). The purpose of Chapter IV is to analyze previously available data and some newly gathered data to locate possible causes of good or poor juror management. The most promising of the modifications which resulted from this analysis is evaluated in Chapter V. Chapter V presents a description of the development of a simulation model of a "typical" court system. The effectiveness of a change in the simulated court's Juror Management Approach is evaluated.

Chapter VI presents guidelines for further research and further development of the model constructed. Chapter VII presents the conclusions and generalizations of the study.

## CHAPTER II

### THEORETICAL MODEL AND RESEARCH METHODOLOGY

The purposes of this chapter are to explain the model used in this study and the methodology used to test the hypotheses. Chapter II is divided into two major sections. The first section discusses the development of the model. It presents the results of prior studies discovered through the literature search, the basic model used in the study, the variables to be used in testing the hypotheses, and modifications in the basic model necessary to test the hypotheses.

The second section of this chapter describes the empirical testing of the model. This section also outlines the approach used for the selection of particular district courts, data sources, and the methodology used in the empirical examination.

#### Development of the Model

The first phase in the development of the model consisted of a literature search to locate prior studies and "juror management models" which have been developed. These models have not reached a very advanced state in their development. The lack of an empirically supported model became very evident.

#### Juror Management Systems

In order to gain a better understanding of the problem of the utilization of jurors, it is desirable to understand the juror selection

process as it currently exists and a typical juror management system. The literature is relatively sparse on this subject. One study was made in May, 1970 by Westinghouse Public Systems Management Services.<sup>1</sup> This study included a survey of the juror selection and management system of the U. S. Federal District Court for the Southern District of New York.

#### Westinghouse Study

In the Westinghouse study, a research team visited the court for a two-day period to obtain basic information. Interviews were conducted with the clerk of the court, the chief deputy clerk, and the staff member in charge of juror management. The few jury statistics and regularly maintained records were inspected. The Westinghouse research team compiled this information into a narrative description of the juror selection and juror management process for the court. Certain standard statistics and characteristics were tabulated. These statistics included a breakdown of petit juror expenses for the calendar year 1969, the number of judgeships authorized, the total number of jury trials during fiscal year 1969, the annual number of petit jurors drawn from the qualified wheel and available for service, and a breakdown of case load into criminal and civil categories.

The U. S. District Court for the Southern District of New York summons jurors for a two-week period.<sup>2</sup> According to the Westinghouse

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<sup>1</sup>"Survey of Juror Selection and Management Systems in the Federal Courts," a report undertaken at the request of the Federal Judicial Center by the Public Systems Management Services Organization of Westinghouse Electric Corporation, 1970. (Used by permission of the Federal Judicial Center.)

<sup>2</sup>Ibid., p. 15.

study the average number of days served at court per juror for the Southern District of New York was seven out of the ten in the two-week period. The Southern District of New York maintains excellent daily records on the activities of jurors; however, tabulations on unused jurors in the lounge or on call are not maintained in an organized manner.<sup>3</sup>

#### Jury selection process

The source of names for jury service is a magnetic tape of the voter registration lists.<sup>4</sup> The detailed steps used in processing the voter registration tapes are outlined in Figure 1. The District uses the General Services Administration computer in Manhattan to select names from the voter registration tapes, to generate the master wheel and the qualified wheel tape files, and to address questionnaires.<sup>5</sup> Statistics concerning the jury selection process are shown in Figure 2.

#### Juror Management in the Southern District of New York Court

The Southern District of New York Court operates on a master calendar, with the exception of four judges who operated on individual calendars on a pilot basis.<sup>6</sup> At the time of the study there were 24 Federal judges in this court. In a typical month, five of these 24 would be assigned to hear criminal cases and eight would preside over

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<sup>3</sup>Ibid., p. 10.

<sup>4</sup>Ibid.

<sup>5</sup>Ibid.

<sup>6</sup>Ibid., p. 11

FIGURE 1

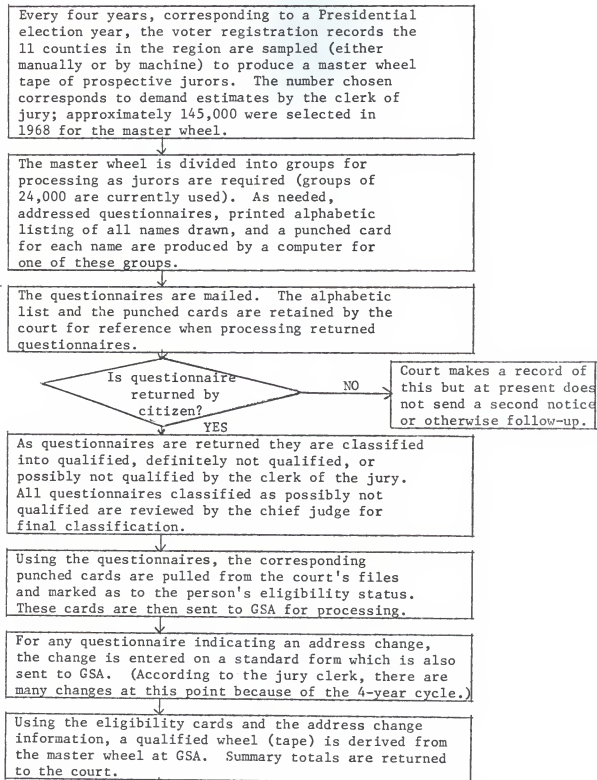
JUROR SELECTION IN THE SOUTHERN DISTRICT OF NEW YORK<sup>3</sup><sup>3</sup> Westinghouse, p. 33.

FIGURE 1--Continued

Ninety days before jurors are needed, the clerk of the jury estimates the number of jurors needed for the month (approximately 600 for each two-week panel, plus additional for highly publicized trials). The qualified wheel is used to draw this number of names, previously postponed names are drawn from the qualified tape on a uniform random basis.

For each of the names chosen the computer generates a summons, pay voucher, card for the jury room wheel, and a punched card for use by the clerk of the jury, and provides the court with an alphabetic list of the names drawn.

The clerk stamps the date of appearance and his signature on each summons and delivers to a U. S. Marshal for transmittal to juror via certified mail. Approximately 100 of the 600 summons are selected and marked for Grand Jury service.

The voucher form, punched card, wheel card, and name list are retained by the clerk.

Those persons summoned who seek excuse or postponement return the form on the back of the summons (approximately 200 out of 600 mailed). After review by the chief judge, the postponement date (next date available), excuse, or other information is entered on the punched card for the person (punched when summons was printed). The card is sent to GSA and entered in the next update of the qualified wheel.

Do jurors  
report to court  
as directed  
in summons?

NO

If the summons was undelivered, or the person does not appear, the name is returned to the qualified wheel.

Yes (Approximately 400 out of 600)

Jury clerk asks if anyone has been charged with a felony since receiving the summons or anyone wishes to be excused at this time. If excused or postponed by judge, his card is appropriately marked and returned to GSA as above.

The jury clerk asks for any address changes since summons and makes appropriate changes using standard form.



FIGURE 2

THE JURY SELECTION PROCESS--  
SOUTHERN DISTRICT OF NEW YORK

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Number of questionnaires mailed in 1969.	52,000
Percent completed and returned.	90%
Percent of citizens not responding.	3%
Percent of citizens not found by Post Office.	7%
Percent qualified.	40-45%
Percent excused.	Information not available.
Percent exempt.	Information not available.
Percent not qualified.	Information not available.
Number of jurors summoned per two- week.	600
Percent excused (by request or on court's motion because there are more jurors than needed) before appearance.	33%
Percent not found by Post Office.	3%
Percent excused on or after appearance date.	25%
Percent available to serve.	39%

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<sup>8</sup>Ibid., p. 22.

civil cases.<sup>9</sup> The clerk sends forty to fifty jurors for a panel in a criminal case and 35 jurors in a civil case.<sup>10</sup>

Most of the judges in the Southern District of New York start with twelve jurors in the jury box, and challenge (both for cause and peremptorily). Each challenged juror is replaced until twelve acceptable jurors are obtained. This is the procedure in most courts according to the Westinghouse study.<sup>11</sup>

The Southern District of New York operates with between 200 and 300 qualified jurors in the lounge,<sup>12</sup> with each juror serving for a two-week period. "During the later phases of the two-week period some of the jurors may be excused before the period is up. All excuses for jurors are handled through the clerk of the court."<sup>13</sup> The jury management process used in the Southern District of New York is described in Figure 3.

#### Utilization of Jurors

The major portion of what work has been done in the area of jury management systems deals with the utilization of jurors.

#### Merrill and Schrage Study

The study which encompassed the broadest objectives concerning utilization of jurors was done by Frederic R. Merrill and Linus Schrage. The study entitled "A Pilot Study of Utilization of Jurors" was done in

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<sup>9</sup>Ibid., p. 31.

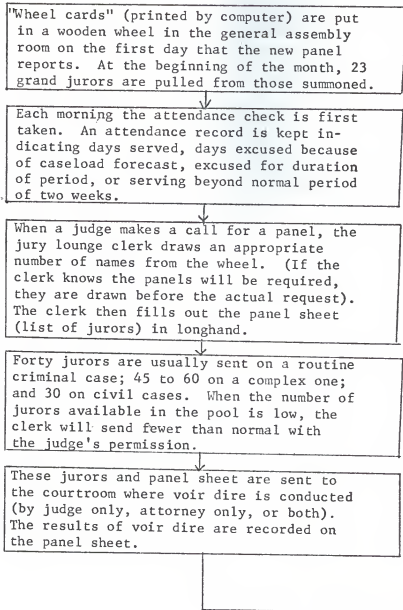
<sup>10</sup>Ibid., p. 30.

<sup>11</sup>Ibid., p. 17.

<sup>12</sup>Ibid., p. 31.

<sup>13</sup>Ibid.

FIGURE 3

JUROR MANAGEMENT IN THE SOUTHERN  
DISTRICT OF NEW YORK<sup>14</sup>

<sup>14</sup>Westinghouse, p. 33.

FIGURE 3--Continued

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graph TD; A[When jurors that have served on cases and jurors not selected for a jury return to the general assembly room, their wheel cards are set aside. When the wheel becomes empty, these returned cards are then re-inserted into the wheel.] --> B[A clerk from the assembly room visits each judge in the morning to determine juror needs for the following day. Forecasts of need are developed by noon for the next day. At present, the needs of four judges on an individual calendar are not easily forecasted. A certain number of jurors are allocated for these each day. As possible, jurors are released for the period, for several days, or put on call. Frequently a given set of jurors is excused until the second week in the period.] --> C[A daily report of activity is produced for the chief judge. The statistics gathered include number of jurors on trials, number of jurors on call, number of jurors in the assembly room, judges requesting panels, etc. This report is filed by the Jury Clerk.] --> D[At the end of a jury term (every two weeks), the attendance record is used by the pay clerk to produce pay vouchers. These vouchers are sent to the U. S. Marshal for payment.]
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A daily report of activity is produced for the chief judge. The statistics gathered include number of jurors on trials, number of jurors on call, number of jurors in the assembly room, judges requesting panels, etc. This report is filed by the Jury Clerk.

At the end of a jury term (every two weeks), the attendance record is used by the pay clerk to produce pay vouchers. These vouchers are sent to the U. S. Marshal for payment.

conjunction with the American Bar Foundation. All of the data used in the study were gathered in the Western District of Missouri during an 18-day period in October 1968.<sup>15</sup>

The stated purposes of the project were

- (1) to examine carefully juror use and separate myth from reality on the question of how juror time is used;
- (2) to determine the relationship between juror time use and juror attitudes toward jury service;
- (3) to examine the relationship between juror time use and the total operation of the system;
- (4) to suggest possible modifications to the court systems that might improve the use of juror time and at the same time improve operations of the entire court system.<sup>16</sup>

In addition to these objectives of describing and analyzing juror use in the Western District of Missouri, the researchers attempted to evaluate the methods of investigation and analysis used in their study, with the objective of making suggestions for further development of a research methodology.

Merrill and Schrage decided not to survey the existing courtroom procedures in a large number of courts because they felt that there was no way to evaluate the procedures in terms of their efficiency of juror usage. Instead, the study concentrated on an evaluation of procedures used in the Western Missouri District Court.

The Western District of Missouri was selected for several reasons: (1) the District since early 1967 has utilized a jury selection system similar to that adopted in the Jury Selection and Service Act of 1968;<sup>17</sup> (2) the court has a reputation for being well

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<sup>15</sup>Frederic R. Merrill and Linus Schrage, "A Pilot Study of Utilization of Jurors," (Chicago: American Bar Foundation, 1970) p. 1.

<sup>16</sup>Ibid., p. 2.

<sup>17</sup>Jury Selection and Service Act of 1968, 82 Stat. 53 (1968).

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<sup>16</sup>Ibid., p. 2.

<sup>17</sup>Jury Selection and Service Act of 1968, 82 Stat. 53 (1968).

managed; and (3) the district was small, hence allowing a small scale study.<sup>18</sup> Additionally, the district had a favorable relationship between case load and judicial resources which allowed more deliberate planning with respect to jury utilization.<sup>19</sup> This fact was stated in the study but not given as a reason for the selection. The last two of the reasons above for selection of this particular district, caused some problems to be obscured which might otherwise have been evident in other districts.

There are several reasons why conclusion based upon the data gathered during the study period may not be representative:

First the court has two annual accelerated dockets. The data used in the study were gathered during one of these accelerated dockets. However, this accelerated docket would probably be considered relatively quiet in some large metropolitan courts.<sup>20</sup>

Second, only civil trials having an expected duration of less than one week are heard during the accelerated docket; hence, any complicated or lengthy cases were excluded from the data gathering phase.<sup>21</sup> Additionally, since no criminal trials take place during this period, no data were gathered on the effect of a criminal trial.

Third, prior to the accelerated docket period, the clerk of the court sent an inquiry to the attorneys of record in all cases on the docket requesting the name of the counsel who would try the case. That trial counsel was then sent a notice of the accelerated docket period and asked to arrange his schedule to avoid a conflict.<sup>22</sup>

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<sup>18</sup>Merrill and Schrage, op. cit., pp. 4-5.

<sup>19</sup>Ibid., p. 5.    <sup>20</sup>Ibid.

<sup>21</sup>Ibid., p. 6.    <sup>22</sup>Ibid.

Last, the amount of data gathered was small. A total of 108 jurors actually served during the docket period and a total of ten cases were brought to trial, (five of which resulted in verdicts).<sup>23</sup>

#### Merrill and Schrage study results

Many of the results of the Merrill and Schrage study are descriptive in nature. For example, the researchers accumulated statistics on characteristics of the jurors. These included: sex, race, religion, educational background, family income, marital status, age, occupation, and employment status.<sup>24</sup> Additionally, the researchers accumulated answers to questions such as the following: (1) What is the disposition of your work, business, or profession while you are serving on a jury? (2) Have you had any previous jury experience? (3) Have you ever been employed by an insurance company?<sup>25</sup> In addition to this descriptive profile of the jurors who served, the researchers reached other conclusions regarding the jury system. The major conclusions of the study follow.

Cost of jurors.--The researchers in the Merrill and Schrage study attempted to attach a monetary value to the time spent in jury service. They determined the explicit cost of the jurors to the court, the explicit cost of jury service to the juror, and the juror's estimate of the "value" of jury service. The researchers suggested that the best measure of value was what the jurors thought they should receive for service. Of those jurors who responded to this question

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<sup>23</sup>Ibid., p. 12.

<sup>24</sup>Ibid., pp. 16-19.

<sup>25</sup>Ibid., pp. 20-21.



after they had completed their service, the mean amount they requested per juror day was \$18.59.<sup>26</sup> Most of the jurors indicated that the figure they gave was for fees only and that mileage should also be paid. After mileage was added, the amount requested was \$22.00 per juror day.<sup>27</sup>

Juror attitudes.--The researchers attempted to determine the attitude of jurors toward jury service both before and after their service. Additionally, they correlated some of the changes in attitude with experiences which the jurors had during their service. The data collected suggested that the juror tends to adopt a more negative attitude concerning the pleasantness and utility of his service if he:

- (a) did not have an opportunity to participate in rendering a verdict.
- (b) spent more than twenty percent of his time waiting;
- (c) was challenged at least once.
- (d) reported for jury service and was sent home without being seated on a jury.<sup>28</sup>

These suggested reasons why jurors adopted negative attitudes toward their jury service indicate that there is an additional benefit which accompanies improved juror utilization. This benefit is in addition to the explicit savings which accompany increased utilization.

Efficiency of the Western District of Missouri Court.--Merrill and Schrage concluded that the Western District of Missouri makes very efficient use of juror time. They concluded this on the basis of data gathered in the form of time cards kept by some of the jurors during the eighteen day study. They found that the jurors spend approximately

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<sup>26</sup>Ibid., p. 30.

<sup>27</sup>Ibid., p. 31.

<sup>28</sup>Ibid., pp. 37-38.

seventy percent of their time engaged in activities attributable to the trial and only seven percent of their time waiting.<sup>29</sup>

These figures contrast to those gathered by the same court and reported to the Administrative Office of the United States Courts for Fiscal Year 1971. According to the court's own records, 53.8 percent of those jurors summoned on a particular day did not serve in any way.<sup>30</sup>

Unfortunately, the data gathered for the Administrative Office of the United States Courts are not directly comparable to that gathered for the Merrill and Schrage study. The data gathered for the Administrative Office were for the entire 1971 fiscal year. The data gathered during the Merrill and Schrage study were for an eighteen day period.<sup>31</sup>

The following explanation furnishes some insight into the discrepancy. In the Merrill and Schrage study, time cards were kept by jurors who stayed at the courthouse. The data gathered for the Administrative Office take into account the total number of jurors who were summoned and actually reported (hence were paid for their jury service). The percentage of jurors not serving is formed by dividing the number of jurors who reported but were not needed by the total number of jurors summoned.

It must also be pointed out that due to the short duration of the Merrill and Schrage study and the restricted nature of the Accelerated Docket, the data gathered have a greatly restricted value. It

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<sup>29</sup>Ibid., p. 38.

<sup>30</sup>"Juror Utilization in United States Courts," a report prepared by the Division of Procedural Studies and Statistics, The Administrative Office of the United States Courts, August 13, 1971.

<sup>31</sup>Merrill and Schrage, op. cit., p. 1.

can be argued that the obvious attention of the researchers to juror utilization might have influenced the actions of some of the court personnel.<sup>32</sup>

Tradeoff between efficiency of juror usage and trial production.--

The second conclusion of the Merrill and Schrage study was that the efficiency of juror usage which they noted was achieved to some extent at the cost of trial production.<sup>33</sup>

In fourteen trial days, only ten cases were brought to trial and five reached verdict. The four trial judges were in trial only 22 days out of a possible 56. The court operated with no ready pool of waiting jurors and used no staggered voir dire. Cases were begun only in the morning and generally only during the early part of the week. To some extent cases were scheduled according to the availability of jurors.<sup>34</sup>

This conclusion suggests a correlation between high juror utilization and relatively low trial production. This points out one possible trade-off. It would be possible for a court to call fewer jurors for a particular trial calendar. This would probably reduce the amount of time spent by jurors who were never reached on the jury list. This would, however, most probably be balanced by an increase in the amount of time the court stands idle due to the unavailability of a full jury. Some of the explicit costs of having the court idle include the judge's salary, the salary of the clerks, and the cost of the physical facilities involved. In addition to these explicit costs, there are certain unassignable costs to society associated with the idle court.

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<sup>32</sup>Ibid., p. 47. Hawthorne suggests that the actual process of observation will have some effect on the process being observed.

<sup>33</sup>Ibid., p. 47. <sup>34</sup>Ibid.

For example, the defendant who must wait for his case to be tried may be worse off as a result. The delay may create personal anxiety, prejudice his chances for advancement in his job, etc. Therefore, if there is a relationship between juror utilization and case production, any changes in the juror management system should consider all of the effects which may occur as a result.

Need for planning juror supply and demand.--One factor which affects the supply of jurors is the ratio of those who actually report to the number who are summoned. Jurors may be excused by the court either before they are summoned, after they are summoned, or in open court. It is reasonable to expect that the ratio of the number of jurors who will actually report to the number who are summoned will depend, to some extent, upon the court's practices in excusing jurors before call and in open court. Merrill and Schrage found that 43 percent of the persons summoned in the Western District of Missouri during the study period actually served.<sup>35</sup> They pointed out that the data were probably not sufficient for accurate predictions because the period covered was too short.<sup>36</sup>

Many factors affect the demand for jurors. One of these is the number of cases that actually begin trial. The researchers found that only 37 percent of the cases set on the accelerated trial docket actually began trial and required jurors.<sup>37</sup> The data suggested that there is a relationship between the type of case being tried and its

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<sup>35</sup>Ibid., 50.

<sup>36</sup>Ibid.

<sup>37</sup>Ibid.

settlement time. For example, it was found that in the Western District of Missouri, personal injury cases are more likely to be settled than any other type; insurance coverage cases tend to be settled later in the process, but before trial; and eminent domain cases are more likely to go to trial.<sup>38</sup> However, the data gathered did not establish these relationships conclusively.<sup>39</sup>

Duration of voir dire and trial.--Another factor which affects the demand for jurors is length of the voir dire and the trial. Merrill and Schrage found that a voir dire required an average of 84 minutes and the average duration of a trial was 497 minutes.<sup>40</sup> These data applied to those cases which reached trial during the accelerated docket.

It was also found that the duration of the voir dire seemed to be related to the type of case being tried. A test of significance of the differences found was not performed. The data gathered suggested a similar relationship between the duration of the trial and the type of trial being heard.<sup>41</sup>

The number of challenges exercised.--The Western District of Missouri had a problem in determining the number of jurors to be assigned to a case. "Without a ready pool of jurors the consequences of exhausting the panel are serious because there are no additional jurors available if a case uses more jurors than the average."<sup>42</sup> This

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<sup>38</sup>Ibid., p. 51.

<sup>39</sup>Ibid.

<sup>40</sup>Ibid.

<sup>41</sup>Ibid., p. 53.

<sup>42</sup>Ibid., p. 54.

situation is very similar to that faced in some other districts in the Federal Court System.

The average juror demand is highly irrelevant. In a few cases the number of challenges exercised may be zero while in other situations the number of challenges exercised may be very large. Merrill and Schrage attempted to determine if particular classes of people were more likely to be challenged. The only statistically significant result reached was the positive relationship between challenges for cause and the previous connection of the potential juror with an insurance company.<sup>43</sup> The data which were gathered suggested some relationship between demography and challenges. For example, they found that women were more frequently challenged than men, older persons were more frequently challenged than younger, and people who attended college were more frequently challenged than those who had not.<sup>44</sup>

A simulation model.--Merrill and Schrage constructed a simulation model of a court system in an attempt to answer some questions about juror utilization. The model which they constructed was of a larger court than the Western Missouri District. The model utilized a simulated jury pool. In this respect it was considerably different than the Western Missouri District. However, the time parameters used were those gathered in the study of the Western Missouri District.

The model which was constructed allowed for the possibility of not having enough jurors in the jury pool at the start of a voir dire.<sup>45</sup>

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<sup>43</sup>Ibid., p. 63.

<sup>44</sup>Ibid., p. 56.

<sup>45</sup>Ibid., p. 74.

Hence, the start of a case could be delayed by the lack of available jurors in the jury pool. A crucial part of the model, however, was the size of the panels which were sent to the voir dire. In the model, any time a panel was requested for a voir dire, 28 potential jurors were sent.<sup>46</sup> The assumption made in the construction of the model was that the panel of 28 would always be sufficient. This assumption greatly simplified the model. However, it did not accommodate the real-life situation where the number of challenges exercised becomes large. For example, in a criminal case, with a required jury of twelve plus two alternates, this particular assumption allows a maximum of fourteen challenges. In most cases observed during the study, the number of challenges for cause is potentially unlimited. In some cases, more than fourteen potential jurors are challenged.<sup>48</sup>

An important assumption was made in the construction of the simulation model. The model ignored the propensity of jurors who had been challenged once to be challenged again and again. In an actual court situation, this propensity thereby increases the size of the required jury pool.

Some of the other assumptions made in the simulations which were run follow:<sup>49</sup>

1. A day has 360 useful minutes.
2. No voir dires are started after 180 minutes of the day have elapsed.
3. Idle jurors are released after 181 minutes of the day have elapsed.
4. Jury size is twelve.

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<sup>46</sup>Ibid., p. 72. <sup>47</sup>Ibid., p. 54.

<sup>48</sup>Ibid., p. 57. <sup>49</sup>Ibid., p. 75.

Conclusions from the simulation.--Some concrete conclusions were arrived at as a result of running the simulation utilizing the assumptions listed above. The researchers concluded, for example, that in most cases, the size of the jury pool could be significantly reduced below the number necessary if simultaneous voir dire were held by all judges. Specifically, a jury pool of slightly more than enough to support half as many simultaneous voir dire as there are judges would be enough to keep the court operating at a maximum trial rate.<sup>50</sup>

#### Pabst Study

Another approach to the problem of the utilization of jurors was made by William R. Pabst, Jr. Pabst took a descriptive approach in his study of the Washington, D. C. district court. The data which he gathered covered the months of January, February, and March 1970. A total of 59 court days were covered. The study focused on the estimation of the basic parameters of the court. These included the various operating times such as: the duration of the voir dire, the duration of the trial, the distribution of the voir dire and trial throughout the day, and the daily peak number of jurors required for voir dire and trials.<sup>51</sup>

Duration of voir dire.--Pabst found that the average duration of a voir dire in the Washington D. C. District Court during the study was 57 minutes. The median duration was 45 minutes and the standard

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<sup>50</sup>Ibid., p. 80.

<sup>51</sup>William R. Pabst, Jr., A Study of Juror Waiting Time Reduction. (Washington D.C.: Prepared under a grant from the Law Enforcement Assistance Administration, United States Department of Justice, 1971.)



deviation of the times observed was 47 minutes.<sup>52</sup> This distribution was described reasonably well by the log-normal distribution.<sup>53</sup>

These average durations contrast to those found in the Merrill and Schrage study. In that study, the typical voir dire was found to last an average of 84 minutes.<sup>54</sup>

This one particular comparison points out the lack of uniformity in the voir dire duration between districts.

During the three month study, the average panel size for civil cases was less than that of criminal cases. For this reason, it was suggested that the voir dire might have a shorter duration. However, Pabst found that there was no significant difference between the duration of the civil voir dire and the duration of the criminal voir dire.<sup>55</sup>

It has also been suggested that a voir dire takes longer when there are a large number of challenges exercised. However, Pabst found no correlation between the number of challenges exercised and the duration of a voir dire. Cases involving capital punishment were the exception to this statement. In general, these had a large number of challenges and long voir dire durations.<sup>56</sup>

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<sup>52</sup> Ibid., p. 80.

<sup>53</sup> It sometimes happens that transformation of observations will allow the data to be described by a normal distribution. In this particular case, Pabst found that a plot of the logarithm of the voir dire durations described reasonably well a normal distribution.

<sup>54</sup> Merrill and Schrage, op. cit., p. 51.

<sup>55</sup> Pabst, op. cit., p. 48.

<sup>56</sup> Ibid.

Duration of the trial.--The average duration of the 228 trials which took place during the study period was twelve hours and 47 minutes. The median duration was nine hours.<sup>57</sup> Twelve of the cases were exceptionally long. Most of these cases were civil. These twelve cases had durations of greater than 31 hours. Pabst found that criminal and civil cases had approximately the same duration if the exceptionally long cases were excluded.

It was observed that cases which started with an afternoon voir dire averaged approximately two hours longer than most cases which started with a morning voir dire. As was the case with the other statistics, after the twelve exceptionally long cases were excluded, cases which started in the morning were found to be only slightly shorter than those started in the afternoon.<sup>58</sup>

A plot of frequency versus duration of the criminal cases was inconclusive. The plot of frequency versus duration was approximately uniform between two hours and twelve hours. However, the plot was not uniform outside of this interval. Additionally, a plot of frequency versus the duration of civil trials was also inconclusive. This distribution did not appear to be normal.<sup>59</sup> However, no test of significance was performed. Pabst suggested that the reason for the unusual distribution in the case of civil trials was the different types of cases being heard. He suggested that each of these different types might have a different mode.<sup>60</sup>

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<sup>57</sup>Ibid.

<sup>58</sup>Ibid., p. 49.

<sup>59</sup>Ibid., p. 52.

<sup>60</sup>Ibid., p. 51.

A plot of frequency versus the duration of cases starting in the morning was bimodal. On the other hand, a similar plot of afternoon starts had a single mode. Pabst suggested that these plots appeared to be log-normal.<sup>61</sup> However, no test of this assertion was performed.

The challenge prone juror.--The number of times each individual juror was challenged throughout the study was recorded. It was found that a typical juror was challenged only once during the month.<sup>62</sup> A plot of frequency versus the number of challenges per juror was found to be poorly described by the Poisson distribution.<sup>63</sup> The poor fit indicated that the distribution was not well explained by chance. If in fact the data could be described by a Poisson distribution, theory suggests that two panelists might be expected to be challenged six or more times. Instead, there were fourteen individuals so challenged. Pabst concluded that this implied that there were some jurors who were marked, either by occupation, relationship to some other person, or some other characteristic that prevented them from serving on juries.<sup>64</sup> No juror after being challenged five or more times in a particular month subsequently served on a jury. This suggested that some number of consecutive challenges might be used as evidence that the juror will not contribute further to the operation of the court and hence that juror could be excused.<sup>65</sup>

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<sup>61</sup>Ibid.

<sup>62</sup>Ibid., p. 76.

<sup>63</sup>Ibid.

<sup>64</sup>Ibid.

<sup>65</sup>Ibid., p. 86.

Peak demand for jurors.--Pabst concluded that the most significant variable which enters into the job of juror management is that of the peak number of jurors required.<sup>66</sup> He reasoned that this number should determine the number of jurors in the jury pool. A record was kept of the maximum (or peak) number of jurors or panelists used on every day during the study. The frequency distribution of the peak number of jurors was found to be skewed widely to the right. Pabst found this to be characteristic of a Gumbel extreme - value distribution with theoretical mode of 154; median of 166; and an average of 173.5. He found the estimating equation to be  $x = 154 + 30y$ , where  $y$  is the characteristic of a theoretical extreme - value distribution. The observed data were found to fit the Gumbel extreme - value distribution very closely.<sup>67</sup> Pabst concluded that "this distribution shows that under these conditions the monthly pool would have to be large to meet most of the expected varied peaks."<sup>68</sup>

Some other conclusions were:<sup>69</sup>

1. The average number of courts in session is highly correlated with the average number of jurors used per week.
2. The average number of courts in session is not a good indicator of the peak number of jurors needed.
3. Consequently, neither average number of jurors used nor average number of courts in session are good indicators of the demand for jurors.

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<sup>66</sup>Ibid., p. 68.

<sup>67</sup>Ibid., p. 62.

<sup>68</sup>Ibid.

<sup>69</sup>Ibid., p. 68.

The simulation.--The data which Pabst gathered were inconclusive. Therefore, he built a simulation model of a court with either six, nine, or twelve courts. Instead of using the time parameters which he had observed, Pabst constructed a model which used the actual histories of cases which had been observed. He excluded from consideration those cases with extremely large panels of 100 or greater, and the cases which lasted 100 hours or longer. Cases were selected at random from the 241 cases observed.<sup>70</sup> When a case was randomly selected, all of the relevant variables observed for that case were used in the simulation. These variables included:

- (a) the observed duration of the voir dire,
- (b) the observed duration of the trial,
- (c) the number of panelists chosen,
- (d) the number of challenges, and
- (e) the number of jurors used to try the case.

During the simulation, a voir dire and subsequently a trial were started as soon as another trial was finished. No cases were started after 3:00 P.M. and endings were allowed until 5:00 P.M. Any cases which were continued to the next day started at 10:00 A.M.<sup>71</sup>

Conclusion from the simulation.--As a result of the simulation, Pabst concluded that the only information needed to predict the required number of jurors is the number of courts continuously operating.<sup>72</sup> Pabst concluded that the required number of jurors could be calculated by adding 2.2 times the standard deviation to the average

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<sup>70</sup>Ibid., p. 88.

<sup>71</sup>Ibid.

<sup>72</sup>Ibid., p. 92.

peak number of jurors.<sup>73</sup> This formula provided a sufficient number of jurors 96 percent of the time. It was based upon the assumption that the distributions were normal. It should be remembered that Pabst found the distribution of the peak number of jurors to be described in the Gumbel Extreme - Value Distribution.<sup>74</sup> While not explicitly stated, there is an implicit assumption that this distribution would be normal if the court is operating in a continuous manner.

It has been suggested that one way to reduce the peak demand for jurors is to delay voir dires so that they will not occur simultaneously.<sup>75</sup> However, the results of the Pabst simulation show that delaying the starts did not reduce the peak number of jurors required but it did reduce the number of cases heard.<sup>76</sup> Pabst compared the results achieved in the simulation with the observed data, and concluded that continuous operation of the court could reduce the peak number of jurors required.<sup>77</sup>

Variations of peak requirements throughout the week.--Pabst observed that the average peak number of jurors varied throughout the week. He found that the average peak number of jurors decreased from Monday to Friday. Pabst concluded that it would be possible to decrease the under-utilization of jurors by taking into account the different peaks throughout the week.<sup>78</sup>

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<sup>73</sup>Ibid.

<sup>74</sup>Ibid., p. 62.

<sup>75</sup>Merrill and Schrage, op. cit., p. 76, and Westinghouse, op. cit., p. 9.

<sup>76</sup>Pabst, op. cit., p. 93.

<sup>77</sup>Ibid., p. 94.

<sup>78</sup>Ibid., p. 98.

The studies by Westinghouse, Merrill and Schrage, and Pabst represent the most significant attempts to deal with the subject of juror utilization. The simulation models developed by both Merrill and Schrage, and Pabst indicated a useful methodology for further investigation. Additionally, the findings of these studies suggested further hypotheses to be tested.

#### Models Used to Test Hypotheses

The overall hypothesis of this research is that the Federal District Courts could reduce the number of jurors they summon and still have enough jurors present to hear the cases that are called. For working purposes this general hypothesis is broken down into three hypotheses. The basic model for analysis of the overall hypothesis can be stated in words as follows: Juror Utilization increases as the number of jurors supplied more closely approximates the number of jurors required. Stated as a functional relationship:

$$U = f(S,D)$$

where U = juror utilization,

S = number of jurors supplied,

D = number of jurors demanded.

The above functional relationship postulates that juror utilization is a dependent variable. In this model, juror utilization increases as the number of jurors supplied more closely matches the number of jurors demanded.

An important part of the research is to identify those factors or variables which affect or determine the number of jurors demanded. Additionally, another objective of this research is to examine those relationships which influence the number of jurors supplied. Juror

utilization cannot be improved significantly without more accurately forecasting the supply and demand for jurors.

Hypothesis (1).--The first of the working hypotheses is that there is a correlation between the percentage of unused jurors and the rate of trial production. This hypothesis originated with the Merrill and Schrage study of the Western District of Missouri.<sup>79</sup> These researchers suggested that a court might gain a relatively high juror utilization at the expense of relatively low trial production. This hypothesis postulates that a low rate of trial production is correlated with a low percentage of unused jurors.

This amounts to a hypothesis that the correlation coefficient relating these two variables is significantly greater than zero.

Hypothesis (1) will be rejected if the correlation coefficient between trial production and the percentage of unused jurors is not found to be significantly greater than zero.

This hypothesis is significant because of the implication that juror utilization can be increased only at the expense of reduced case production. The purpose of this hypothesis is to attempt to determine whether such a relationship exists between case production and juror utilization.

Hypothesis (2).--The second of the working hypotheses is that the number of jurors summoned represents the best estimate of the need for jurors. The basic model for the testing of this hypothesis is statistical. It states that the number of unused jurors is a function of the number of jurors called minus the number of jurors who served on trial juries minus the number of jurors challenged and hence not

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<sup>79</sup>Merrill and Schrage, op. cit., p. 65.



used. The model used for the evaluation of this working hypothesis was derived from the following relationship.

$$E = f(B, C, D) \quad (2.1)$$

Where E = the number of jurors not used,

B = the total number of jurors available to serve,

C = the number who served on trial juries,

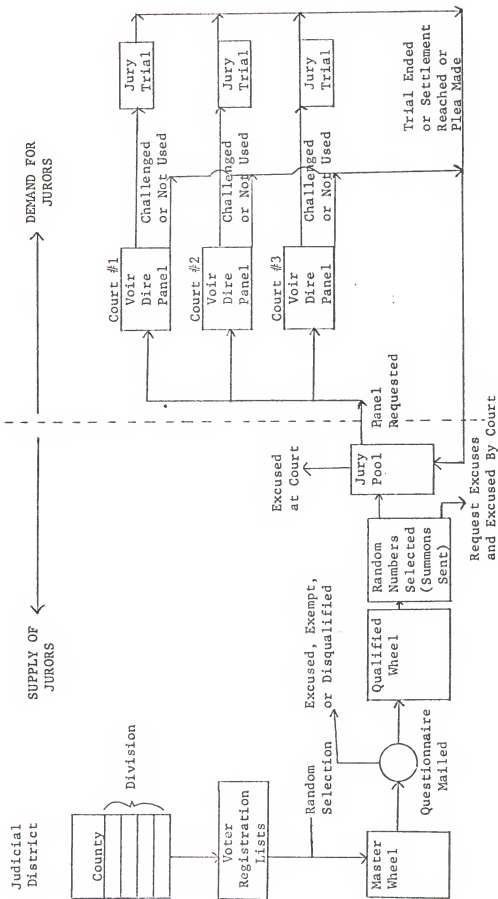
D = the number challenged and not used.

In this relationship, B (the total number of jurors available for service) is the independent variable. C (the number who served on trial juries) is a stochastic variable. Of its nature it is mostly uncontrollable. However, it is possible to have some influence upon it. In this model, C will be treated as a state of nature and hence be uncontrollable. D (the number challenged and not used) is another stochastic variable. For the most part it is uncontrollable and hence an exogenous variable. Given a particular court with its policies, this assumption is a very realistic one. E (the number of jurors not used) is the dependent variable.

Hypothesis (2) will be rejected if E is significantly greater than zero. This is the same as proving that B is not the best estimate of C plus D.

Hypothesis (3).--The third working hypothesis is that a simulation model can be developed which provides a basis for the testing of proposed changes in the juror management system of the Federal District Courts. The basic model used can be illustrated using the following diagram, Figure 4. The left hand side of the diagram illustrates those factors which influence the supply of jurors. The right hand side of the diagram illustrates those factors and relationships which influence

FIGURE 4  
MODEL OF THE SUPPLY AND DEMAND  
FOR JURORS



the demand for jurors. Hypothesis (3) will be rejected therefore if the model demonstrates that the number of jurors not utilized is significantly reduced by using a juror management approach uncovered in the comparative analysis (Chapter IV).

### Empirical Test

The empirical testing of the hypotheses was performed with data obtained on all 93 Federal District Courts. These data included: (1) the results of a questionnaire mailed to each division of each of the courts; (2) statistics supplied by the Administrative Office of the U. S. Courts and the Bureau of the Census; and (3) information obtained by personal interview. This section briefly describes the data sources, the method used to obtain the data, and some of the limitations of the data.

### Data Sources

The scarcity of data pertaining to the subject of this dissertation became very evident during the research. Very little in the way of historical data was available and very little in the form of data summaries was available. In some of the courts where data did exist, they were available only at the source level. The source documents were such official records as the criminal docket, the case files, and past calendars of the court.

The lack of data has been observed by other researchers in the area of judicial administration. In a paper prepared for the Operation Research Society of America meeting in April 1972, J. B. Holeman, Jr., and J. Talavage noted the difficulty with source material.

Prior to starting the discussion of real world systems, some mention should be made as to how this information was obtained and why it was obtained in this manner. Initially, every effort was made to find some written material about the administration of justice in Georgia which someone without legal training could understand. In this search several articles were found pertaining to specific aspects of the system, but the area in general was practically void of good written source material. As of the result of this near void, any researcher in this field must be prepared to conduct extensive interviews to gain in-depth knowledge about the system. For this reason, almost all of the knowledge peculiar to the Georgia Courts was obtained through personal interviews.<sup>80</sup>

An interview was conducted with Maureen Solomon at the Institute for Court Management in order to gather background information on juror utilization.<sup>81</sup> An interview was also conducted with Judge Ben Krentzman of the Federal District Court of Florida.<sup>82</sup> The purpose of this interview was to discuss the specifics of the court's juror management system and its approach to increased juror utilization. Additionally, the researcher attempted to ascertain if certain specific data were being recorded or collected.

The information obtained from these interviews formed the framework for the determination of further data needs. The required data were obtained from three sources: (1) The J. S. 11 Report on Juror

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<sup>80</sup>J. B. Holeman, Jr. and J. Talavage, "Computer Simulation to Improve Court Operations," an unpublished paper presented at the Operations Research Society of America meeting, April, 1972, p. 8.

<sup>81</sup>An interview was conducted with Maureen Solomon, Project Director, Institute of Court Management, University of Denver Law School, in Denver on December 22, 1971.

<sup>82</sup>An interview was conducted with Judge Ben Krentzman, Federal District Judge for the Middle District of Florida, in Tampa on March 28, 1972.

Service,<sup>83</sup> (2) other data collected by the Administrative Office of the United States Courts, and (3) a jury questionnaire sent to each division of each Federal District Court. These three data sources are discussed below in some detail.

#### The J. S. 11 Report

In March 1970 the judicial conference of the United States authorized the resumption of the J. S. 11 Report on Juror Service upon the recommendation of the Committee on the Operation of the Jury System.<sup>84</sup> The judicial conference agreed that there was a need to collect data in the area of juror utilization. Therefore, the 93 districts of the federal courts have maintained certain records pertaining to juror utilization since the start of fiscal year 1971. These forms are submitted to the Administrative Office monthly. The form itself includes data on the number of criminal and civil cases tried on each day in a particular court. Additionally, it contains information on the total number of jurors available for service, the total number of jurors who are challenged and not used, the total number of jurors not used, and a summary index titled the Juror Usage Index. This index is formed by dividing the total number of jurors available for service by the total number of jury trial days during the month. These data are summarized for fiscal year 1971 by the Administrative Office of the United States Courts and published in the form of a booklet.<sup>85</sup> These data are not available for periods prior to fiscal year 1971.

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<sup>83</sup>"Petit Jurors Used - J. S. 11 Report," A monthly report to the Administrative Office of the U. S. Courts.

<sup>84</sup>Reports on the Proceedings of the Judicial Conference of the United States, 1970 (Washington D. C.: G.P.O.), p. 20.

<sup>85</sup>"Juror Utilization in United States Courts," a report prepared by the Division of Procedural Studies and Statistics, The Administrative Office of the United States Courts, August 13, 1971.

### Court Management Statistics

The Administrative Office of the United States Courts gathers other information in addition to that contained in the Juror Utilization report. This information has been collected for many years. The kinds of data which are available include: information on the number of judge-ships authorized for a particular court, the changes in the number of filings by court, the number of filings per judge by court, and various statistics on the backlog facing a particular court. In addition to this information, the Administrative Office has assembled these same statistics by circuit.<sup>86</sup>

All of these statistics are aggregated for a particular court. Many of the districts are composed of several divisions which act in a similar manner. However, in some districts, each of the divisions act in the autonomous manner. Additionally, the data are aggregated for a one-year period. This aggregation poses some difficulties in using the data which are represented.

### Jury Questionnaire

In order to obtain information which was not available from other sources, this researcher designed a questionnaire which was sent to each division of all of the 93 federal district courts. A total of 159 questionnaires was sent out. A total of 99 questionnaires were returned from seventy districts.

Questionnaire design.--As the available literature was surveyed, the lack of available data became very evident. In order to be able to

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<sup>86</sup>"Management Statistics for United States Courts," a report to the Chief Justice of the United States, the Chairmen and members of the Judicial Councils of the Circuits, and the Chief Judges and Judges of the United States District Courts by the Director of the Administrative Office of the United States Courts, February, 1972.

specify the desired information, it was necessary to formulate the basic model for use in the research. The data requirements and hence the questionnaire design evolved from the different "models" which were found in the literature and from the new model developed for this research.

The development of the model will be covered in Chapter III. However, the design of the model used in this study was partially the result of the interview with Judge Ben Krentzman mentioned above. This discussion was followed by more intensive discussions with the Chief Clerk for the Tampa Division of the Middle District of Florida. A pretest of the questionnaire was performed. Mr. Robert Cook, Chief Clerk of the Tampa Division Court, answered the original questionnaire design as he thought appropriate for the Middle District Court. Mr. Cook made several very useful suggestions for the redesign of the questionnaire.

Certain difficulties were experienced with the questionnaire despite its pretesting. Specifically, questions number 1 and 2 on the questionnaire were not explicit enough for twelve of the individuals who filled out questionnaires. Questions number 1 and 2 were interpreted by these twelve courts as asking for the number of jurors who actually tried non-capital criminal cases and civil cases. The intent of the questionnaire was to determine the size of the panel which was present for the voir dire in the case of a typical non-capital criminal case and in the case of a typical civil case. The responses provided by the twelve individuals were suspect because the response to the question did not include any provision for challenges. As a result, letters were sent to each of the twelve judges involved. The letter contained a more explicit statement of the desired information. Of the twelve letters sent out, responses were received from ten.

Figure 5 illustrates the original design of the questionnaire. Figure 6 illustrates the revised questionnaire after its pretest in the Middle District of Florida Court. Figure 7 illustrates the reformulated questions which were sent to the twelve courts which misinterpreted the intent of questions number 1 and 2.



## FIGURE 5

## ORIGINAL QUESTIONNAIRE DESIGN

## Jury Questionnaire

Please return to: M. J. White, University of South Florida, 830 First Street South, St. Petersburg, Florida

1. What is the typical number of jurors on a panel for a non-capital criminal trial?

Range: \_\_\_\_\_ to \_\_\_\_\_

Explanation: (if required)

2. What is the typical number of jurors on a panel for a civil case?

Range: \_\_\_\_\_ to \_\_\_\_\_

Explanation: (if required)

3. Would you provide an estimate of the percentage of cases which are postponed because of lack of available jurors.

Estimate: \_\_\_\_\_ #

Explanation: (if required)

4. When you summon jurors for a trial docket, what is the typical number summoned?

Range: \_\_\_\_\_ to \_\_\_\_\_

Explanation: (if required)

5. Jurors who have been called in and are not being used on a particular day are: (Please check the appropriate blank)

\_\_\_\_\_ (a) Dismissed and asked to return the next day.

\_\_\_\_\_ (b) Dismissed and asked to return in \_\_\_\_\_ days.  
(fill in)

\_\_\_\_\_ (c) Dismissed and not asked to return.

\_\_\_\_\_ (d) Other: (if other - please explain below)

6. What problems do you have with predicting the number of jurors that should be called-in?
7. Do you think that anything can be done to increase juror utilization in your district? What?

## FIGURE 6

### REVISED QUESTIONNAIRE DESIGN

### Jury Questionnaire

PLEASE RETURN TO: M. J. White, University of South Florida, 830 First St.,  
So., St. Petersburg, Florida 33701

1. What is the typical number of jurors on a panel for a non-capital criminal trial?

Minimum: \_\_\_\_\_ Maximum: \_\_\_\_\_ Most Likely: \_\_\_\_\_

Explanation: (if required)

2. What is the typical number of jurors on a panel for a civil case?

Minimum: \_\_\_\_\_ Maximum: \_\_\_\_\_ Most Likely: \_\_\_\_\_

Explanation: (if required)

3. Would you provide an estimate of the percentage of cases which are postponed because of lack of available jurors.

Estimate:

Explanation: (if required)

4. Jurors who have been called in and are not being used on a particular day are: (Please check the appropriate blank)

(a) Dismissed and asked to return the next day.

(b) Dismissed and asked to return in \_\_\_\_\_ days.  
(fill-in)

(fill-in)

(c) Dismissed and not asked to return.

(d) Dismissed and asked to return on a certain day.

(e) Other: (if other - please explain below)

5. (a) When you summon jurors for a trial calendar, what is the typical number summoned?

Minimum:                  Maximum:                  Most Likely:

Explanation: (if required)

5. (b) Does the number in 5(a) vary much from month to month?

Yes (if yes - please explain why briefly)

No

6. What problems do you have with predicting the number of jurors that should be called-in?

7. Please estimate the proportion of jurors excused by the court:

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before call      #
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in open court #

8. Have you adopted a particular method which has increased your utilization of jurors? Please describe it briefly.

FIGURE 7  
FOLLOW-UP LETTER  
UNIVERSITY OF SOUTH FLORIDA

TAMPA . ST. PETERSBURG

OFFICE FOR ACADEMIC AFFAIRS  
ST. PETERSBURG CAMPUS  
830 FIRST STREET, SOUTH  
ST. PETERSBURG, FLORIDA 33701

813: 898-7411

May 30, 1972

Dear Judge:

Thank you for the very prompt return of the juror utilization questionnaire which I sent you on May 12.

Unfortunately, on the basis of the responses which your court provided, it appears that two of the questions were vague. Would you or your clerk please answer the two following questions on this letter and return it to me in the addressed, stamped envelope which is enclosed as soon as possible.

Thank you very much for your help.

Very truly yours,

Michael J. White  
Assistant Professor of Management

MJW/ks  
Enclosure

Questions

1. What is the typical number of jurors on a panel sent to a voir dire (veniremen) for a non-capital criminal trial?

Minimum \_\_\_\_\_ Maximum \_\_\_\_\_ Most Likely \_\_\_\_\_

2. What is the typical number of jurors on a panel sent to a voir dire (veniremen) for a civil case?

Minimum \_\_\_\_\_ Maximum \_\_\_\_\_ Most Likely \_\_\_\_\_

## CHAPTER III

### EMPIRICAL EXAMINATION OF THE THEORETICAL MODEL

This chapter is divided into two sections. First, the test of Hypothesis (1) is presented. This hypothesis was tested to determine whether or not increased juror utilization can be achieved only at the expense of reduced case production. Second, Hypothesis (2) was tested to determine how well the courts estimate their need (demand) for jurors.

#### Test of Hypothesis (1)

Hypothesis (1) was tested by performing a correlation analysis of the relationship between trial production and juror utilization. In this analysis, juror utilization was represented by a percentage of unused jurors for each particular court for fiscal year 1971. This particular measure of juror utilization was analyzed in conjunction with the total number of case terminations per judge for each of the same districts. Additionally, the percentage of unused jurors was analyzed with respect to the number of trial terminations per judge for each court in the Federal District Court System.

#### Differences in Juror Utilization

There is an implicit assumption in the work which has been done in the area of juror utilization. That implication is that some courts do a better job of utilizing jurors than others. Basically, the

percentage of unused jurors represents a relatively good proxy-variable which is related to juror utilization. That is, when juror utilization increases the percentage of unused jurors would decrease. Another proxy-variable which is used in conjunction with juror utilization is the Juror Usage Index. Since the Juror Usage Index represents essentially the number of people who are summoned divided by the number of jury trial days, this variable is also inversely related to juror utilization. As the Juror Usage Index increases, juror utilization decreases.

Data regarding the percentage of unused jurors and the Juror Usage Index are collected monthly for each district in the Federal Court System.<sup>1</sup> These data are summarized yearly.<sup>2</sup> The yearly averages represent aggregate estimates which are related to juror utilization. A comparison of the Juror Usage Index by district for the fiscal year 1971 shows that this figure varied between 15.03 for the Western District of Michigan to 57.54 for the Southern District of New York. Considering all the 93 districts as the population, the separation between the Western District of Michigan and the Southern District of New York amounts to 6.6 standard deviations. This difference would have to be considered significant. Additionally, the Southern District of New York would have to be considered as an outlier.

#### Analysis Using Percentage of Unused Jurors

A correlation analysis of the relationship between the percentage of jurors not used and the total number of case terminations per judge

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<sup>1</sup>"Petit Jurors Used - J.S. 11 Report, " a monthly report to the Administrative Office of the U. S. Courts.

<sup>2</sup>"Juror Utilization in the United States Courts," a report prepared by the Division of Procedural Studies and Statistics, The Administrative Office of the United States Courts, August 13, 1971.

was performed.<sup>3</sup> The value of R for this relationship was found to be 0.055. This figure was arrived at using the data from all 93 districts in the court system for fiscal year 1971. This particular correlation coefficient is not significant. That is, the hypothesis that this correlation coefficient is significantly greater than zero is rejected.

An analysis of the relationship between the percentage of jurors not used and the total number of trial terminations per judge was performed. The value R in this case was -0.061. This correlation coefficient was not significant. The hypothesis that the correlation coefficient was significantly greater than zero was rejected.

#### Analysis Using the Juror Usage Index

The percentage of jurors not used by a particular court is only one indicator of juror utilization. Another indicator is provided by the Juror Usage Index. As indicated, the Juror Usage Index represents the total number of jurors available for service divided by the total number of jury-trial days. Therefore, it is logical to expect the Juror Usage Index to decrease as juror utilization increases.

A similar analysis was performed using the Juror Usage Index instead of the percentage of jurors not used.<sup>4</sup> A correlation analysis of the relationship between the total number of case terminations per judge and the Juror Usage Index provided an  $R = 0.081$ . This correlation

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<sup>3</sup>This analysis was performed using the BMD 02R -Stepwise Multiple Regression Program. This program is a part of the BMD Biomedical Computer Programs of the University of California Health Sciences Computing Facility. The program used was revised July 17, 1970. The data used was obtained from "Management Statistics for United States Courts," a report to the Chief Justice of the United States and others by the Director of the Administrative Office of the United States Courts, February 1972.

<sup>4</sup>Ibid.

coefficient was not significant. The hypothesis that the correlation coefficient was significantly greater than zero was rejected.

Similarly, the correlation between the total number of trial terminations per judge and the Juror Usage Index was performed. This analysis provided a value of  $R = -1.162$ . This correlation coefficient was not significant. The hypothesis that the correlation coefficient is significantly greater than zero was rejected.

In summary, the suggestion of a correlation between high juror utilization and low trial production was not substantiated. No relationship was found between the rate of trial production and either the percentage of jurors not used or the Juror Usage Index.

The conclusion that there is no relationship between juror utilization and the rate of trial production indicated that increased juror utilization may be achieved without significantly affecting the rate of trial production. It has been suggested that increased juror utilization comes at the expense of trial production by a particular court.<sup>5</sup> The test of this particular hypothesis has rejected that particular concept.

#### Test of Hypothesis (2)

Hypothesis (2) was tested through the use of equation (2.1), page 47, an analysis of variance, a test of independence of principles of classification, and an analysis of Z-scores. Equation (2.1) was rearranged slightly for the purpose of analysis. Hypothesis (2) must be accepted if in fact we cannot reject the hypothesis that the number of unused jurors is equal to zero. Thus, the test of hypothesis (2) amounts to a test of the following:

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<sup>5</sup>Merrill and Schrage, op. cit., p. 47.

$$E = 0$$

(3.2)

where  $E$  = the number of jurors not used.

This hypothesis was tested in one particular district in the Federal Court System. The Southern District of New York is the largest in the Federal Court System.<sup>6</sup> The Court has been the focus of considerable attention with regard to its juror selection and management system. A minimum of two studies has been done on the jury selection and management system for the U. S. Federal District Court for the Southern District of New York. The first was done in May, 1970 by Westinghouse Public Systems Management Services. The latest was a report prepared by William S. Stoever, of the Institute of Judicial Administration in New York. This report was prepared under a grant from the Federal Judicial Center.<sup>7</sup>

These reports included suggestions as to how juror utilization might be improved. For this reason, this district was particularly appropriate.

The Southern District of New York operates on a two-week jury cycle. That is, a new pool of jurors is called every two weeks. Thus the number of jurors called-in varies over the ten-day cycle.

An analysis of the relationship between the number of jurors not used and the number of jurors who actually served was performed.

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<sup>6</sup>The criteria used is the number of judgeships authorized for a particular district. The Southern District of New York had 27 judgeships authorized during fiscal year 1971. The next largest court was the United States District Court for Eastern Pennsylvania which had nineteen judgeships authorized.

<sup>7</sup>William A. Stoever, "Suggestions for Improving Juror Utilization in the United States District Court for the Southern District of New York," (New York: The Institute of Judicial Administration, prepared under a grant from the Federal Judicial Center), 1971.



A comparison of the variance of the number of jurors not used to the variance of the number of jurors who actually served was performed. This analysis indicated that there was a significantly greater amount of variability in the number of jurors not used than in the number of jurors who actually served. This indicated that the number of jurors not used is more volatile than the number of jurors who actually served. That is, the ratio of the number of jurors not used to the number of jurors who were actually used varies over the ten-day cycle. This relationship was investigated further. The data were set up in a contingency table. In order to determine whether the classification criteria were meaningful or effective, a test of independence of principles of classification was performed. The average number of jurors used was tabulated for each day in the ten-day cycle. Similarly, the average number of jurors not used was also tabulated for each day in the ten-day cycle. The contingency table which resulted is shown in Figure 8. The numbers inside the table represent the average number of jurors in that category. For example, the average total number of jurors either used or not used on day number one of the ten-day cycle was 323. Of those 323, 127 were used on the average on day number one of the ten-day cycle. Of the 323, an average of 196 were not used on day number one of each ten-day cycle.

The hypothesis that the two principles of classification--the day number in the cycle and the ratio of unused to used jurors--are independant was tested. The expected frequency for each cell was computed so that all the totals were the same as the actual observations and the frequency of each of the twenty cells was proportional to the total. The sample value of Chi-square was found to be 44.52. This

FIGURE 8  
TEST OF INDEPENDENCE OF PRINCIPLES  
OF CLASSIFICATION --

PROPORTION OF JURORS NOT USED ON VARIOUS DAYS -  
SOUTHERN DISTRICT OF NEW YORK

Day Number	1	2	3	4	5	6	7	8	9	10	
Average Number of Jurors Used	127	140	124	102	87	110	114	111	105	75	1,095
Average Number of Jurors Not Used	196	147	111	78	57	141	109	89	67	48	1,043
Average Total Number Called	323	287	235	180	144	251	223	200	172	123	2,138

$$\text{Chi-Square} = \chi^2 = \frac{\sum (\text{EXP.} - \text{OBS})^2}{\text{EXP.}}$$

$$\chi^2 = \text{EMPIRICAL} = 44.52$$

$$\chi^2 (0.95, 9\text{df}) = 16.92$$

Therefore, the proportion of those jurors not used divided by those used is not independent of day number of the ten-day cycle.

value is significant at the one percent level with nine degrees of freedom.<sup>8</sup> The hypothesis is therefore rejected. The principles of classification are not independent. There is a relationship between the day number of the ten-day cycle and the ratio of the average number of jurors not used to the average number of jurors used. This means that the ratio of the number of unused jurors to the number of jurors used is some function of the specific day the court is in session in its ten-day cycle.

Consider the number of jurors who are not used on day number six of every ten-day cycle. It was found that the average number of jurors not used on day number six was 140.71 jurors.<sup>9</sup> The standard deviation of this sample was found to be 38.9 jurors. The distribution of the number of unused jurors on day number six of a cycle appeared to be normal. The number of jurors not used was compared to a normal distribution with a mean of 140.7 and a standard deviation of 39.

The hypothesis that the distribution of the number of jurors not used on day number five was normal was tested using the Kolmogorov-Smirnov test, (figure 9).

The sample value of D was 0.1027. The critical value of D at the 95 percent level of significance with  $N = 8$  is 0.470. Therefore, the hypothesis that the distribution is normal is accepted.

Consider also the number of jurors who are not used on day number one of every ten-day cycle. It was found that the average number

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<sup>8</sup> The level of significance used throughout this dissertation is five percent. However, the fact that this hypothesis is rejected at a higher level of confidence is included for information only.

<sup>9</sup> These figures were arrived at by analysis by the J.S. 11 Report for the Southern District of New York for the period of January-March 1972.

FIGURE 9

THE NUMBER OF JURORS NOT USED ON DAY  
NUMBER SIX AS COMPARED  
TO A NORMAL DISTRIBUTION@

Observed Number of Unused Jurors	Observed Cum. Freq. Percent	Expected Cum. Freq.*	D**
86	0.1250	0.0808	0.0442
114	0.2500	0.2465	0.0035
125	0.3750	0.3446	0.0304
133	0.5000	0.4207	0.0793
147	0.6750	0.5640	0.0610
161	0.7500	0.6988	0.0512
219	0.8750	0.9776	0.1026

$$*Z = \frac{OBS - M}{\sigma}$$

@Based Upon Mean = 140.7 and STD. DEV. = 39

\*\*D = OBS. CUM. FREQ. - EXP. CUM. FREQ.

D = 0.1026

D (0.95, 7) = 0.500

Therefore, accept the hypothesis that the distribution is normal (at the 95 percent level of significance).

of jurors not used on day number one was 196.4 jurors. The standard deviation of this sample was found to be 32.31 jurors.<sup>10</sup> Assuming that the population is normal, this means that on day number one of the ten-day cycle, the district could call in 100 less jurors and there would only be one-tenth of a percent chance of running out of jurors.<sup>11</sup>

A similar situation exists on day number two, day number three, day number four, day number six, and day number seven. On days number five, number eight, number nine, and number ten, the number of jurors not used represents approximately one and a half standard deviations above zero. On day number five of each ten-day cycle, a Z of 1.4 was observed for the three month period. The number of unused jurors on day number five represented the lowest Z score of any of the days in the ten-day cycle.

If a Z of 1.4 is assumed to provide an adequate buffer stock of jurors (that is, an adequate number of jurors so that the number of delays are within an acceptable range) then there were overcalls on each of the other nine days in each ten-day cycle. Assuming a Z of 1.4 provides an adequate margin, the average number of jurors to be called on each of the other nine days could be reduced by:

156 for the first day in a ten-day cycle,  
100 for the second day in a ten-day cycle,  
88 for the third day in a ten-day cycle,

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<sup>10</sup>Ibid.

<sup>11</sup>This particular figure considerably overstates the probability of running out of jurors. Since the number of 196 is the average number of jurors not used at any time during the day, this figure is probably accepted. The reason is that the demand for jurors is staggered randomly throughout the day. Stated another way, just because all jurors were used at some time during the day would not mean the court would necessarily run out of jurors.

FIGURE 10  
ANALYSIS OF NUMBER OF UNUSED JURORS  
SOUTHERN DISTRICT OF NEW YORK

Day Number	1	2	3	4	5	6	7	8	9	10
Mean Number of Unused Jurors	196.40	146.83	111.17	77.67	57.20	140.71	108.86	88.86	67.50	48.50
Standard Deviation	32.31	33.53	16.76	14.40	40.95	38.95	27.68	60.09	41.66	22.51
Z Score = Mean/Standard Deviation	6.08	4.38	6.63	5.39	1.40*	3.62	3.93	1.48	1.62	2.15
Z Score - 1.4*	4.68	2.98	5.23	3.99	0	2.22	2.53	0.08	0.22	0.75
Number of "Excess" Jurors = (Standard Deviation) x (Z - 1.4)	156	100	88	57	0	86	70	5	9	17

\*Minimum Z Score

57 for the fourth day in a ten-day cycle,  
86 for the sixth day in a ten-day cycle,  
70 for the seventh day in a ten-day cycle,  
5 for the eighth day in a ten-day cycle,  
9 for the ninth day in a ten-day cycle, and  
17 for the tenth day in a ten-day cycle.

This reduction would amount to a savings of \$75,300 to the court at the rate of \$20 per day for the first three months of 1972 for the Southern District of New York. The analysis is summarized in Figure 9. Even without the smaller reductions in the call-in for the eighth, ninth, and tenth days, the savings would be very significant.

#### Summary

The purpose of this chapter was to explain the empirical test performed on Hypotheses (1) and (2).

The contention of this dissertation that juror utilization could be increased without significantly effecting trial production was substantiated by the test of Hypothesis (1). Hypothesis (1) was rejected because the correlation coefficient between trial production and juror utilization was not found to be significantly greater than zero. The rejection of Hypothesis (1) indicates that there is no evidence to suggest that increased juror utilization can be achieved only at the cost of decreased trial production.

The contention of this dissertation that the number of jurors summoned does not represent the best estimate of the need for jurors was substantiated by the test of Hypothesis (2). Hypothesis (2) was rejected because the number of jurors not used was found to be significantly greater than zero. The rejection of Hypothesis (2) indicates

that some courts could do a better job of estimating their need for jurors.

For example, the Southern District of New York could significantly reduce the number of jurors called in if it attempted to predict its need for jurors and varied the panel size in an attempt to match the specifics of the particular cases.

Based in part upon the rejection of both Hypotheses, a simulation model incorporating some proposed changes is tested in Chapter V. The rejection of Hypothesis (1) amounts to the rejection of the idea that the courts can increase utilization only at the expense of case production. The rejection of Hypothesis (2) amounts to a rejection of the idea that the courts are doing everything possible to forecast more accurately the supply and demand for jurors.



## CHAPTER IV

### COMPARATIVE ANALYSIS

The purpose of this chapter is to analyze previously available data and some newly gathered data in an attempt to determine which factors influence juror utilization. The comparative analysis that was performed included correlation analysis, multiple regression, analysis of variance, cross-tabulation with a test of significance, and a comparative analysis of two courts with "extreme" values of juror utilization. This chapter is divided into three parts:

1. An analysis of the Court Management Statistics for each of the 93 districts.
2. An analysis of the responses to the jury questionnaire sent to all 93 districts.
3. Analysis of "extreme" cases of juror utilization.

Each of these three forms of comparative analysis provided information as to the existence of better juror management approaches.

#### Analysis of the Court Management Statistics

In addition to the data which are contained in the juror utilization report, the Administrative Office for the United States Courts collects data on other factors related to the operation of the Federal District Courts. Some eighteen pieces of data were made available for each of the 93 district courts by the Administrative Office of the Courts. The data made available are illustrated in Figure 11. These statistics include two which are directly related to juror

FIGURE 11  
COURT MANAGEMENT STATISTICS

- $X_1$  = the percentage change in filings for the current year over the last fiscal year.
- $X_2$  = percentage change in filings over the last three years.
- $X_3$  = the percentage change in filings over six years ago.
- $X_4$  = the number of civil filings per judge.
- $X_5$  = the number of criminal filings per judge.
- $X_6$  = the number of pending cases per judge.
- $X_7$  = the weighted case load per judge.
- $X_8$  = the total number of case terminations per judge.
- $X_9$  = the total number of trial terminations per judge.
- $X_{10}$  = the median number of months from filing to disposition for a civil case.
- $X_{11}$  = the median number of months from filing to disposition of a criminal case.
- $X_{12}$  = the number of civil cases over three years old.
- $X_{13}$  = the number of civil cases over three years old as a percentage of the total number of civil cases.
- $X_{14}$  = the number of triable defendants in cases over one year old.
- $X_{15}$  = the number of triable defendants in cases over one year old as a percentage of the total.
- $X_{16}$  = the number of cases under advisement over sixty days.
- $X_{17}$  = the percentage of jurors not serving.
- $X_{18}$  = the Juror Usage Index.

utilization. These factors are the percentage of unused jurors for the district and the Juror Usage Index.

An analysis of the Court Management Statistics furnished by the Administrative Office provided a starting point for further analysis. This analysis involved three different approaches. First, a correlation analysis was performed between all of the available Court Management Statistics and the indicators of juror utilization. These indicators were the Juror Usage Index and the percentage of unused jurors. This analysis yielded a correlation matrix. The general hypothesis that there is no correlation between the Court Management Statistics and the indicators of juror utilization was tested. Second, a multiple linear regression was performed using the two indicators of juror utilization alternately as the dependent variables. The independent variables in these multiple regressions were the Court Management Statistics. Third, an analysis of the Z scores for the various Juror Usage Indexes and the percentage of unused jurors was made. The objective of this particular analysis was to identify a specific court which was highly effective in juror utilization and also to identify a court which had indicators of low juror utilization. The objective was to isolate courts with the extremes of juror utilization. The actual analysis of the cause of these extremes makes up the third part of this chapter.

#### The Correlation Analysis

A correlation analysis was performed between eighteen variables which were collected as part of the Court Management Statistics assembled by the Administrative Office of the Courts. These statistics were collected for fiscal year 1971. These eighteen variables and a brief

explanation concerning their source and interpretation is provided in Figure 11.

The general hypotheses that there is no correlation between either the Juror Usage Index or the percentage of unused jurors and any of the other variables were tested.<sup>1</sup> In each case, the hypothesis was tested at a five percent level of significance.

In the case of the percentage of unused jurors, the hypothesis was rejected in only one case. A positive correlation of .288 was found between the percentage of unused jurors and the number of civil cases over three years old ( $X_{12}$ ). This correlation coefficient was sufficient to reject the hypothesis that there is no correlation between the two variables. However, the correlation coefficient for each of the other variables was not significant. The correlation coefficients for each of the variables is shown in Figure 12.

The hypotheses that there is no correlation between the Juror Usage Index and any of the other sixteen court management statistics was tested. The hypotheses were rejected in the case of five different variables. These variables were: the number of civil cases over three years old ( $X_{12}$ ), the number of civil cases over three years old as a percent of the total number of civil cases ( $X_{13}$ ), the number of triable criminal cases over one year old ( $X_{14}$ ), the number of triable criminal cases over one year old as a percent of the total number of criminal

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<sup>1</sup>This analysis was performed using the BMD 02R -Stepwise Multiple Regression Program. This program is a part of the BMD Biomedical Computer Programs of the University of California Health Sciences Computing Facility. The program used was revised July 17, 1970. The data used was obtained from "Management Statistics for United States Courts," a report to the Chief Justice of the United States and others by the Director of the Administrative Office of the United States Courts, February 1972.

FIGURE 12

CORRELATION OF MEASURES OF JUROR  
UTILIZATION WITH OTHER COURT  
MANAGEMENT STATISTICS

Variable Number	Correlation With Percentage of Unused Jurors ( $X_{17}$ )	Correlation With Juror Usage Index ( $X_{18}$ )
$X_1$	-0.186	-0.055
$X_2$	-0.182	-0.167
$X_3$	-0.041	-0.031
$X_4$	0.055	-0.028
$X_5$	-0.017	-0.092
$X_6$	0.152	0.164
$X_7$	-0.084	-0.129
$X_8$	0.055	-0.081
$X_9$	-0.061	-0.162
$X_{10}$	0.085	0.169
$X_{11}$	-0.019	0.102
$X_{12}$	0.288*	0.531*
$X_{13}$	0.169	0.316*
$X_{14}$	0.184	0.387*
$X_{15}$	0.168	0.280*
$X_{16}$	0.156	0.352*

\*Significant at the five percent level.

because of a favorable balance of resources to case load, or alternately, does it have a low case backlog due to a high degree of efficiency in managing its case load? It is possible to postulate two alternate theories regarding the cause and effect relationship:

1. A court has a particularly high juror utilization due to the over all good job it does in managing all of its resources (i.e., jurors, clerks).
2. A court does a particular job of utilizing jurors when, and only when, the "pressure" of a large case backlog is removed.

Either of these theories are plausible. An indication as to the more likely of these two theories was provided by determination of the coefficient of multiple correlation between the Juror Usage Index and the various indicators of case backlog along with a measure of the weighted caseload per judge. Unfortunately, the coefficient of multiple correlation is always expressed as a positive number. This is because it may be the case that some of the independent variables are positively related to the dependent variables while others are negatively related. This being the case, it is not possible to show the direction of the various relationships by means of a single sign associated with the coefficient of multiple correlations. The relationship between case backlog and the weighted caseload per judge was investigated using multiple linear regression. This analysis follows.

#### The Multiple Regression Analysis

The relationship of the sixteen Court Management Statistics (variables) to both the Juror Usage Index and the percentage of unused jurors was investigated further. The multiple linear regression equations were computed. The program used computed a sequence of multiple linear regression equations in a step-wise manner.<sup>2</sup> At each

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<sup>2</sup>Ibid.

step one variable was added to the regression equation. The variable added was the one which made the greatest reduction in the error sum of squares. This variable is the one which has the highest partial correlation with the dependent variable partialled on the variables which already have been added. This variable is also the one which if it were added, would have the highest F value.

The step-wise multiple linear regression procedure was followed with two different dependent variables. First, the procedure was followed with the percentage of unused jurors ( $X_{17}$ ) as the dependent variable. Next, the Juror Usage Index ( $X_{18}$ ) was selected as the dependent variable.

The data from each of the 93 districts were used to arrive at the multiple regression equation. Using the percentage of unused jurors as dependent variable, the resulting equation is:

$$\begin{aligned}
 X_{17} = & 42.04 - 0.115 X_1 - 0.116 X_2 + 0.053 X_3 + 0.016 X_4 - 0.672 X_{11} \\
 & \quad (1.00) \quad (1.48) \quad (1.01) \quad (1.01) \quad (1.15) \\
 & + 0.011 X_{12} + 0.012 X_{14} + 0.066 X_{15} - 0.205 X_{16} \\
 & \quad (1.79) \quad (0.45) \quad (1.02) \quad (0.50) \\
 R^2 = & 0.1804
 \end{aligned}$$

where  $X_{17}$  = the percentage of jurors not serving,

$X_1$  = the percentage change in filings over the last fiscal year,

$X_2$  = the percentage change in filings over three years ago,

$X_3$  = the percentage change in filings over six years ago,

$X_4$  = the total number of civil filings per judge,

$X_{11}$  = the median time from filing to disposition of criminal cases (in months),

$X_{12}$  = the number of civil cases over three years old,

$X_{14}$  = the number of triable defendants in cases over one year old,

$X_{15}$  = the number of triable defendants in cases over one year old  
as a percentage of the total number of criminal cases,

$X_{16}$  = the number of cases under advisement over 60 days.

The significance of the coefficients was determined through their respective T values, shown in parenthesis below the applicable coefficient.

#### The Significance of This Empirical Model

The most significant coefficient is the one for the number of civil cases over three years old ( $X_{12}$ ). Its empirical T value, 1.79, is greater than 1.66, the significant value of T (0.95,83). This finding indicates that the backlog of civil cases over three years old influences the percentage of unused jurors. The regression coefficient of  $X_{12}$  is positive. This implies that the percentage of unused jurors increases as the number of civil cases over three years old increases. Therefore, juror utilization would decrease as the number of civil cases over three years old increases.

The finding that an increase in the backlog of civil cases causes an increase in the percentage of unused jurors has several possible interpretations. One possible interpretation is that as a court becomes more inefficient, its backlog of civil cases increases and its juror utilization decreases. Both of these changes could be symptoms of administrative ineffectiveness of the court. It would be possible to argue, however, that as soon as a court is given enough judicial resources to eliminate the backlog of civil cases, its juror utilization will increase. This alternative explanation indicates that juror utilization is a function of judicial resources.

The coefficient of determination,  $R^2$ , is not of an appreciable magnitude for a cross-section regression model.



A similar approach was taken in order to identify the multiple regression equation using the Juror Usage Index as the dependent variable.

#### Juror Usage Index As The Dependent Variable

The influence of each of the sixteen variables contained in the court management statistics on the Juror Usage Index was investigated. Data from each of the 93 districts were used to determine the multiple regression equation. The resulting equation is:

$$\begin{aligned}
 X_{18} = & 24.54 + 0.018 X_1 - 0.090 X_2 + 0.039 X_3 + 0.020 X_4 \\
 & \quad (0.25) \quad (1.89) \quad (1.38) \quad (0.40) \\
 & + 0.012 X_5 - 0.007 X_6 + 0.002 X_7 - 0.017 X_8 \\
 & \quad (0.28) \quad (0.36) \quad (0.32) \quad (0.47) \\
 & - 0.017 X_9 - 0.056 X_{10} - 0.419 X_{11} + 0.010 X_{12} \\
 & \quad (0.42) \quad (0.19) \quad (1.10) \quad (2.96) \\
 & + 0.0213 X_{13} + 0.019 X_{14} + 0.028 X_{15} - 0.208 X_{16} \\
 & \quad (1.11) \quad (1.21) \quad (0.81) \quad (0.96) \\
 R^2 = & 0.3808
 \end{aligned}$$

where  $X_{18}$  = the Juror Usage Index,

$X_1$  = the percentage change in filings over one year ago,

$X_2$  = percentage change in filings over the last three years,

$X_3$  = the percentage change in filings over six years ago,

$X_4$  = the number of civil filings per judge,

$X_5$  = the number of criminal filings per judge,

$X_6$  = the number of pending cases per judge,

$X_7$  = the weighted caseload per judge,

$X_8$  = the total number of case terminations per judge,

$X_9$  = the total number of trial terminations per judge,

$X_{10}$  = the median number of months from filing to disposition  
for a civil case,

$X_{11}$  = the median number of months from filing to disposition of  
a criminal case,

$X_{12}$  = the number of civil cases over three years old,

$X_{13}$  = the number of civil cases over three years old as a percentage of the total number of civil cases,

$X_{14}$  = the number of triable defendants in cases over one year old,

$X_{15}$  = the number of triable defendants in cases over one year old as a percentage of the total,

$X_{16}$  = the number of cases under advisement over sixty days.

The significance of the coefficients was determined through their respective T values, shown in parenthesis below the applicable coefficient.

#### Significance of This Empirical Model

The most significant coefficient is the one for the number of civil cases over three years old ( $X_{12}$ ). Its empirical T value, 2.96, is greater than 1.66, the critical value of T (0.95,76). This finding, as indicated in the regression involving the percentage of unused jurors, indicates that the number of civil cases over three years old influences the Juror Usage Index.

The coefficient of the percentage change in filings over three years ago ( $X_2$ ) also is significant at T (0.95,76). The value of T of 1.89 exceeds the critical value of T. The regression coefficient of  $X_2$  is negative. This indicates that the Juror Usage Index is higher for courts which have a greater percentage growth in filings over three years ago. One possible interpretation for this finding follows. Courts which experience a significant growth in filings tend to adjust their court administrative system over time to handle the increased caseload. As a result, they develop more efficient means of summoning and using jurors. This interpretation is purely speculative.

The coefficient of determination,  $R^2$ , for the model is still not of a very appreciable magnitude for a cross-section regression model.

#### Comparison of the Empirical Models

The empirical multiple regression equations arrived at for the two indicators of juror utilization do not each have all of the same variables. However,  $X_{12}$  was found to have the most significant coefficient in both regressions. That is, the number of civil cases over three years old was the most significant variable influencing both the percentage of unused jurors and the Juror Usage Index. The second most significant variable in the regression equations was also the same for both of the proxy-variables representing juror utilization. In both regression equations the second most significant variable was the change in filings over three years ago.

In both cases, the coefficient of determination,  $R^2$ , is not of an appreciable magnitude for a cross-section regression model. However, the  $R^2$  equal to 0.2808 using the Juror Usage Index as the dependant variable was far more significant than the value of  $R^2$  which was arrived at using the percentage of unused jurors as the dependant variable.

#### Isolation of Extremes in Juror Utilization

An Analysis was performed in an attempt to isolate or identify particular courts which were highly effective in juror utilization and additionally, to identify those courts which had indicators of low juror utilization. This analysis was accomplished by determining the two scores associated with each court.

The parameters of a particular court that were utilized for this analysis were the Juror Usage Index and the percentage of unused jurors. Using the Court Management Statistics, the mean Juror Usage Index was found to be 22.87. The standard deviation of the Juror Usage Index was found to be 6.407. Similarly, the mean percentage of unused jurors for all 93 districts was 43.10. The standard deviation was found to be 11.688.

Using this information, all courts which had either a Juror Usage Index or a percentage of unused jurors which was more than three standard deviations away from the mean were identified.

Two districts which were identified as "outliers" were the Western District of Michigan and the Southern District of New York. The Western District of Michigan had a Juror Usage Index of 15.03 and an average percentage of unused jurors of 19.3 percent for fiscal year 1971. On the other hand, the Southern District of New York had a particularly high Juror Usage Index of 57.54, and an average percentage of unused jurors of 78.7 percent for fiscal year 1971.

The Juror Usage Index for the Western District of Michigan was 1.22 standard deviations less than the national mean, while its average percentage of unused jurors was 2.04 standard deviations less than the mean for all 93 districts.

The Juror Usage Index for the Southern District of New York was 5.41 standard deviations above the national mean and the percentage of unused jurors was 3.05 standard deviations above the mean for all 93 districts.

Thus, there is a 6.63 standard deviation difference between the Juror Usage Index for the Southern District of New York and the Juror

Usage Index for the Western District of Michigan. On the basis of this analysis it appears that the two courts have significantly different Juror Usage Indexes.

The hypothesis that these two districts had essentially the same Juror Usage Index was tested by the use of analysis of variance. The Juror Usage Indexes for the two districts for each month from April 1970 to December, 1971, were obtained from the Administrative Office of the Courts. These figures are recorded monthly on the JS-11 report. The hypothesis that the mean Juror Usage Index for the two courts is the same was tested. The empirical F value, 66.50, is far greater than 4.21, the critical value of F (0.05, 1, 27). This finding indicates that the Juror Usage Indexes for the Western District of Michigan is significantly lower than the Juror Usage Index for the Southern District of New York. The Analysis of Variance is presented in Figure 12.

These districts were chosen for a comparative analysis. Since they represented extreme cases of juror utilization, the two districts were investigated in greater detail in an attempt to determine the cause of their extreme degree of juror utilization.

#### Analysis of the Responses to the Jury Questionnaire

The data gathered using the jury questionnaire were analyzed in three ways. First, a correlation analysis of all of the "continuous" type of variables was performed with the Juror Usage Index and the percentage of unused jurors. The general hypothesis for this analysis was that the correlation coefficient between the variables identified on the jury questionnaire and indicators of juror utilization such as the juror usage index is equal to zero. Second, a stepwise multiple

FIGURE 13  
ANALYSIS OF VARIANCE OF JUROR USAGE INDEXES  
OF SOUTHERN NEW YORK VS. WESTERN MICHIGAN

	Southern New York	Western Michigan		Sum of Squares	Df	Mean Square	F Ratio
Sample Size (No. of Months Data)	16	13	Between Group	11878.29	1	11878.29	66.50*
Mean Juror Usage Index	56.68	15.98	Within Group	4823.09	27	178.63	
Standard Deviation	17.77	2.70	Total	16701.38	28		

\*Significant at F (0.05, 1, 27)

Therefore, the Juror Usage Index for Southern District of New York is significantly greater than the Juror Usage Index for the Western District of Michigan.

linear regression of these same variables was performed. The Juror Usage Index and alternately the percentage of unused jurors served as the dependent variables. Each served as a proxy-variable representing juror utilization. Third, a test of independence of principles of classification was performed on the responses to the "non-continuous" type of question on the questionnaire. This involved making a decision as to whether the sets of classification criteria were meaningful or effective. These cross-tabulations are useful in suggesting cause-effect relationships among variables.

#### Correlation Analysis of The Jury Questionnaire Data

The general sub-hypothesis which was tested using correlation analysis was; the correlation coefficient is zero for each of the "continuous" type of variables when correlated with the Juror Usage Index and the percentage of unused jurors.<sup>3</sup> The variables that were gathered using the questionnaire are listed in Figure 14 along with their interpretation. The last six of the variables were calculated from the data gathered. These variables were  $X_{31}$ ,  $X_{34}$ ,  $X_{38}$ ,  $X_{41}$ ,  $X_{45}$ , and  $X_{48}$ . Each of these variables represent either the best estimate of the number of jurors used or an estimate of the variance of the number of jurors used.

The data that were gathered for variables  $X_{19}$  through  $X_{27}$  represent each individual court's estimate of the mode and dispersion of the variable under consideration. The three time estimates that

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<sup>3</sup>This analysis was performed using the BMD 02R-Stepwise Multiple Regression Program. This program is a part of the BMD Biomedical Computer Programs of the University of California Health Sciences Computing Facility. The program used was revised July 17, 1970.

FIGURE 14

INTERPRETATION OF VARIABLES GATHERED  
USING QUESTIONNAIRE

- $X_{19}$  = the typical minimum number of jurors on a voir dire panel for a non-capital criminal case.
- $X_{20}$  = the typical maximum number of jurors on a voir dire panel for a non-capital criminal case.
- $X_{21}$  = the most likely number of jurors on a voir dire panel for a non-capital criminal case.
- $X_{22}$  = the typical minimum number of jurors on a voir dire panel for a civil case.
- $X_{23}$  = the typical maximum number of jurors on a voir dire panel for a civil case.
- $X_{24}$  = the most likely number of jurors on a voir dire panel for a civil case.
- $X_{25}$  = the minimum number of jurors summoned for a trial calendar.
- $X_{26}$  = the maximum number of jurors summoned for a trial calendar.
- $X_{27}$  = the most likely number of jurors summoned for a trial calendar.
- $X_{28}$  = the estimate of the percentage of jurors excused by the court before call.
- $X_{31}$  = the best estimate of the mean number of jurors impanelled for a non-capital criminal case.
- $X_{34}$  = the best estimate of the variance of the number of persons empanelled for a non-capital criminal case.
- $X_{38}$  = the best estimate of the mean number of jurors impanelled for a civil case.
- $X_{41}$  = the best estimate of the variance of the number of persons empanelled for a civil case.
- $X_{45}$  = the best estimate of the mean of the number of jurors summoned for a trial calendar.
- $X_{48}$  = the best estimate of the variance of the number of jurors summoned for a trial calendar.



were gathered for each variable were identified using the same terminology used in PERT analysis. The assumption behind this type of analysis is that the minimum estimate is six standard deviations below the maximum estimate. Consequently, the best estimate of the variance is the maximum estimate minus the minimum estimate divided by six, quantity squared:

$$X_{34} = \frac{(X_{19} - X_{18})^2}{6}$$

where  $X_{34}$  represents best estimate of the variance of the number of persons impanelled for a non-capital criminal case. Similarly:

$$X_{41} = \frac{(X_{22} - X_{21})^2}{6}$$

$$X_{48} = \frac{(X_{25} - X_{24})^2}{6}$$

where  $X_{41}$  represents the best estimate of the variance of the number of jurors impanelled for a civil case and  $X_{48}$  represents the best estimate of the variance of the number of jurors summoned for a trial calendar.

By the same PERT type approach, the best estimate of the mean of each of the distributions is represented by the sum of the minimum estimate plus the maximum estimate plus four times the most likely estimate divided by six.

Specifically:

$$X_{31} = \frac{X_{18} + 4 X_{20} + X_{19}}{6}$$

where  $X_{31}$  represents the best estimate of the mean number of jurors empanelled for a non-capital criminal case.

Similarly:

$$X_{38} = \frac{X_{21} + 4 X_{23} + X_{22}}{6}$$

and

$$X_{45} = \frac{X_{24} + 4 X_{26} + X_{25}}{6}$$

where  $X_{38}$  represents the best estimate of the mean of the number of jurors empanelled for a civil case and  $X_{45}$  represents the best estimate of the mean of the number of jurors summoned for a trial calendar. The correlation matrix representing the correlation of each of the variables measured on the questionnaire with respect to both the Juror Usage Index and the percentage of unused jurors is found in Figure 14. The general hypothesis that the correlation coefficient equals zero was rejected at the five percent level of significance in thirteen different cases. Those correlation coefficients which were found to be significant are also indicated in Figure 15.

The two most significant of these are: (1) the correlation associated with the variance in the number of jurors empanelled for a non-capital criminal case ( $X_{34}$ ) and the Juror Usage Index, and (2) the correlation between the variance in the number of jurors empanelled for a civil case ( $X_{41}$ ) and the Juror Usage Index. It is also significant to note that the correlation coefficient is positive in each case. This indicates that the Juror Usage Index is positively correlated with measures of variability in the number of jurors demanded. Since the Juror Usage Index is inversely related to juror utilization, this indicates that there is an inverse relationship between juror utilization and the variability in the number of jurors supplied.

FIGURE 15  
CORRELATION OF MEASURES OF JUROR UTILIZATION  
WITH QUESTIONNAIRE DATA

Variable Number	Correlation With Percentage of Unused Jurors ( $X_{17}$ )	Correlation With Juror Usage Index ( $X_{18}$ )
$X_{19}$	-0.142	-0.069
$X_{20}$	0.107	0.190
$X_{21}$	-0.113	-0.063
$X_{22}$	0.007	0.071
$X_{23}$	0.230	0.272
$X_{24}$	0.077	0.165
$X_{25}$	0.356*	0.408*
$X_{26}$	0.317*	0.413*
$X_{27}$	0.348*	0.426*
$X_{28}$	0.086	0.214
$X_{31}$	-0.067	-0.002
$X_{34}$	0.346*	0.456*
$X_{38}$	0.100	0.177
$X_{41}$	0.422*	0.446*
$X_{45}$	0.345*	0.424*
$X_{48}$	0.230	0.375*

\*Significant at five percent level.

The cause of this particular relationship is not clear. Several alternatives are possible.

- (1) Courts which have greater variability in the number of jurors on a panel for a voir dire have a lower utilization of jurors because this variability causes the jury clerk to have to summon more jurors to be relatively sure of not running out. Those courts which do not need to vary the number of jurors supplied for a voir dire panel to such a degree have less uncertainty regarding the number of jurors to summon.
- (2) High variability in the number of jurors on a panel for a voir dire may be associated with large, metropolitan type courts. These courts are rushed and likely to have a big backlog of cases (there is a positive correlation between the number of criminal cases over one year old ( $X_{14}$ ), and the variance in the size of the voir dire panel for both a criminal and a civil trial--however, the correlation between the number of civil cases over three years old and the variance in the number of jurors supplied for a voir dire panel is not significant). If the variance in the number of jurors supplied for a voir dire panel is positively related to some measure of case backlog, then one would expect that juror utilization would increase as variance in the number of jurors supplied decreased. This is the relationship which is observed.
- (3) Other possible solutions exist to the question of causality, the question of causality cannot be answered by the use of

correlation analysis. However, this analysis poses some indications as to possible explanation.

### The Multiple Regression Analysis

The relationship of the variables that were gathered using the questionnaire along with the Court Management Statistics to both the Juror Usage Index and the percentage of unused jurors was investigated. The multiple linear regression equations were computed. The computational approach taken was the same as that used for the analysis of the Court Management Statistics.<sup>4</sup>

The step-wise multiple linear regression procedure was followed with both dependant variables. First, the procedure was followed with the percentage of unused jurors as the dependent variable. Next, the Juror Usage Index was selected as the dependent variable.

Not all of the questionnaires returned contained all of the necessary data. The amount of missing data varied. Each of the questionnaires which contained all of the data listed in Figure 13 was used. After elimination of those courts which did not return a satisfactory questionnaire, fifty of the 93 courts remained.

The data from each of these fifty districts were used to arrive at the multiple regression equations. Using the percentage of unused jurors as a dependant variable, the resulting equation is:

$$\begin{aligned}
 X_{17} = & 56.20 - 0.23 X_1 + 0.26 X_2 - 0.12 X_3 - 0.07 X_4 - 0.12 X_5 \\
 & (1.68)^1 \quad (2.13)^2 \quad (1.69)^3 \quad (1.21)^4 \quad (1.62)^5 \\
 & + 0.09 X_8 - 0.07 X_9 - 0.42 X_{10} - 0.95 X_{11} - 0.08 X_{13} - 0.02 X_{14} \\
 & (1.48)^8 \quad (0.87)^9 \quad (0.85)^{10} \quad (1.10)^{11} \quad (0.21)^{13} \quad (0.58)^{14} \\
 & - 0.22 X_{20} + 0.10 X_{25} - 0.04 X_{26} + 0.84 X_{41} \\
 & (2.01)^{20} \quad (1.99)^{25} \quad (0.93)^{26} \quad (2.52)^{41}
 \end{aligned}$$

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<sup>4</sup>Ibid.

$$R^2 = 0.4718$$

where  $X_{17}$  = the percentage of jurors not serving,

$X_1$  = the percentage change in filings for the current year over the last fiscal year,

$X_2$  = percentage change in filings over the last three years,

$X_3$  = the percentage change in filings over six years ago,

$X_4$  = the number of civil filings per judge,

$X_5$  = the number of criminal filings per judge,

$X_8$  = the total number of case terminations per judge,

$X_9$  = the total number of trial terminations per judge,

$X_{10}$  = the median number of months from filing to disposition for a civil case,

$X_{11}$  = the median number of months from filing to disposition of a criminal case,

$X_{13}$  = the number of civil cases over three years old as a percentage of the total number of civil cases,

$X_{14}$  = the number of triable defendants in cases over one year old,

$X_{20}$  = the maximum typical number of jurors on a voir dire panel for a non-capital criminal case,

$X_{25}$  = the minimum number of jurors summoned for a trial calendar,

$X_{26}$  = the maximum number of jurors summoned for a trial calendar,

$X_{41}$  = the best estimate of the variance of the number of persons impanelled for a civil case.

The significance of the coefficients was determined through their respective T values, shown in parenthesis below the applicable coefficient.

### The Significance of The Model

The most significant coefficient is the one for the variance in the number of jurors supplied for a civil case ( $X_{41}$ ). Its empirical T value, 2.52, is greater than 1.69, the significant value of T (0.95,34). This finding implies that the variance in the number of jurors supplied for a civil case is related to the percentage of unused jurors. The regression coefficient of  $X_{41}$  is positive. This implies that the percentage of unused jurors tends to increase as the variance in the number of jurors sent to a panel for voir dire in a civil case increases. Therefore, juror utilization would tend to decrease as the variance in the number of jurors sent to a civil voir dire increases. However, this relationship was determined in the absence of data concerning the actual demand for jurors. Without data concerning this demand no causal relationship can be determined.

The second most significant coefficient is the one for the percentage change in filings over the last three years ( $X_2$ ). Its empirical T value, 2.13, is greater than the significant value of T. The regression coefficient of  $X_2$  is positive. This implies that the percentage of unused jurors increases as the percentage change in filings over the last three years increases. This finding is the same as that found in the regression model developed using only the Court Management Statistics.

The coefficients of  $X_{20}$  and  $X_{25}$  are also significant. The regression coefficient for the maximum typical number of jurors on a voir dire panel for a non-capital criminal case is negative ( $X_{20}$ ). This indicates that the percentage of jurors unused decreases as the maximum number of jurors on a voir dire panel for a non-capital criminal case increases.

The regression coefficient for the minimum number of jurors summoned for a trial calendar ( $X_{25}$ ) is positive. This indicates that the percentage of unused jurors increases as the minimum number of jurors summoned for a trial calendar increases.

The coefficient of determination,  $R^2$ , is significantly increased from the regression equation found using just the Court Management Statistics.  $R^2$  was 0.1804 for the regression equation derived using the Court Management Statistics. It is increased to 0.4718 using the data gathered with the questionnaire.

A similar approach was taken in order to identify the multiple regression equation using the Juror Usage Index as the dependent variable.

#### Juror Usage Index as the Dependent Variable

The influence of each of the same variables (those from the questionnaire and the Court Management Statistics) on the Juror Usage Index was investigated. Again, data were available from only fifty of the original 93 districts. The resulting multiple regression equation is:

$$\begin{aligned}
 X_{18} = & 27.19 + 0.04 X_2 - 0.02 X_3 - 0.04 X_4 - 0.06 X_5 - 0.01 X_7 \\
 & (0.81)^2 \quad (0.54) \quad (1.58)^4 \quad (2.15)^5 \quad (0.72)^7 \\
 & + 0.04 X_8 - 0.03 X_9 - 0.39 X_{10} + 0.23 X_{13} - 0.02 X_{14} + 0.06 X_{15} \\
 & (1.89)^8 \quad (0.90) \quad (1.71)^{10} \quad (1.24)^{13} \quad (1.63)^{14} \quad (1.54)^{15} \\
 & + 0.14 X_{19} - 0.28 X_{20} + 0.22 X_{23} + 0.02 X_{27} - 0.05 X_{28} + 0.16 X_{34} \\
 & (1.04)^{19} \quad (2.20)^{20} \quad (2.55)^{23} \quad (2.06)^{27} \quad (0.84)^{28} \quad (1.71)^{34} \\
 R^2 = & .5259
 \end{aligned}$$

where  $X_{18}$  = The Juror Usage Index

$X_1$  = the percentage change in filings for the current year over the last fiscal year.

$X_2$  = percentage change in filings over the last three years.



- $X_3$  = the percentage change in filings over six years ago.  
 $X_4$  = the number of civil filings per judge.  
 $X_5$  = the number of criminal filings per judge.  
 $X_7$  = the weighted case load per judge.  
 $X_8$  = the total number of case terminations per judge.  
 $X_9$  = the total number of trial terminations per judge.  
 $X_{10}$  = the median number of months from filing to disposition for a civil case.  
 $X_{13}$  = the number of civil cases over three years old as a percentage of the total number of civil cases.  
 $X_{14}$  = the number of triable defendants in cases over one year old.  
 $X_{15}$  = the number of triable defendants in cases over one year old as a percentage of the total.  
 $X_{19}$  = the typical minimum number of jurors on a voir dire panel for a non-capital criminal case.  
 $X_{20}$  = the maximum typical number of jurors on a voir dire panel for a non-capital criminal case.  
 $X_{23}$  = the typical maximum number of jurors on a voir dire panel for a civil case.  
 $X_{27}$  = the most likely number of jurors summoned for a trial calendar.  
 $X_{28}$  = the estimate of the percentage of jurors excused by the court before call.  
 $X_{34}$  = the best estimate of the variance of the number of persons empanelled for a non-capital criminal case.

The significance of the coefficients was determined through their respective T values, shown in parenthesis below the applicable coefficient.

### Significance of the Emperical Model

The most significant coefficient is the one for maximum number of jurors on a voir dire panel for a civil case. Its emperical T value, 2.55, is greater than 1.69, the critical value of T (0.95,32). This finding indicates that the maximum number of jurors sent to a voir dire for a civil case influences the Juror Usage Index.

The coefficient of determination,  $R^2$ , is a significant improvement over the  $R^2 = 0.3808$  for the regression equation derived using just the Court Management Statistics. The addition of the questionnaire data caused a noticeable improvement in the coefficient of determination.

### Independence of Principles of Classification

Some of the questions on the questionnaire sent to all 93 districts required responses which were of a "non-continuous" type. Question 4 and Question 5b were of this type. The responses to these questions are not readily measurable by cardinal or ratio scales. Such variables are sometimes known as (0-1) type variables. Question 4 was structured in such a way that the court filling out the questionnaire answered with five possible responses. Question 5b could be answered in a yes/no fashion.

Question 4 dealt with the disposition of jurors who were not being used on a particular day. The question was phrased: "Jurors who have been called in and are not being used on a particular day are:" There are five possible responses indicated, labeled A through E. Question 5 (b) dealt with the variability in the number of jurors summoned for a trial calendar. The question was phrased "Does the number in 5 (a)--(the typical number summoned for a trial calendar)--

vary much from month to month?" The possible responses to this question were yes/no along with a brief explanation requested if the answer was yes. Both of these questions were analyzed by utilizing a test of independence of principles of classification. Cross-tabulations were made with the responses to these two questions. These cross-tabulations are sometimes useful in suggesting cause-effect relationships among variables.

#### Disposition of Unused Jurors

Respondents to the questionnaire were asked to identify the disposition of jurors who had been called in but were not being used on a particular day. Five categories of responses were provided:

- (a) dismissed and asked to return the next day;
- (b) dismissed and asked to return in (fill in) days;
- (c) dismissed and not asked to return;
- (d) dismissed and asked to return on a certain day;
- (e) other: (if other--an explanation was requested).

The responses to this question were set up in a contingency table. In order to determine whether the classification criteria were meaningful or effective, a test of independence of principles of classification was performed. Each response to each category of answer to Question 4 was paired with its respective Juror Usage Index. Then, the responses and their corresponding Juror Usage Index were divided into two categories, those having above-average Juror Usage Indexes and those having below-average Juror Usage Indexes. The average Juror Usage Index for all 93 districts was 22.87.

The contingency table which resulted is shown in Figure 16.

The numbers in the table represent the total number of responses in that

FIGURE 16  
RESPONSES TO QUESTION NUMBER FOUR

	A	B	C	D	E	
Below Average Juror Usage Index	14	6	10	37	17	84
Above Average Juror Usage Index	2	2	2	29	5	40
	16	8	12	66	22	124

Chi-Square (With Yates correction for continuity) =  $\chi^2 =$

$$\sum \frac{(|OBS - EXP| - \frac{1}{2})^2}{EXP}$$

$\chi^2$  Empirical = 6.88 - Not significant at five percent level  
with four df.

Conclusion: There is no relationship between the responses to  
Question 4 and the Juror Usage Index.

category. For example, there were a total of sixteen courts which answered (a) to Question 4. Of those sixteen, fourteen had below-average Juror Usage Indexes and two had above-average Juror Usage Indexes. Similarly, eight courts checked (b) for Question 4. Of those eight, six had below average Juror Usage Indexes and two had above average Juror Usage Indexes. Therefore, the number in each classification or cell is the observed frequency. The numbers at the bottom of the table are the total number of responses to each of the possible categories or "treatment." The numbers at the right hand side of the table represent the total number of responses with corresponding Juror Usage Indexes in the two categories. A total of 124 responses was provided for Question 4. This number is not necessarily the same as the total number of questionnaires returned. Some courts indicated more than one response to Question 4.

The hypothesis that the two principles of classification--the response to Question 4 and Juror Usage Index--are independent was tested. The expected frequency for each cell was computed so that all of the totals were the same as the actual observations, and the frequency of each of the ten cells was proportional to the total. The sample value of Chi-square, corrected for continuity, was found to be 6.88. This value is not significant at the five percent level with four degrees of freedom. The hypothesis is therefore accepted. The principles of classification are independent. There is no relationship between the response to Question 4 and the Juror Usage Index.

#### Variability of The Call

Question 5 (b) dealt with the amount of variability in the typical number of jurors summoned for a trial calendar. The possible

responses to the question were yes--the number summoned varied much from month to month, or no--the number summoned did not vary much.

The responses to the question were set up in a contingency table. In order to determine whether the classification criteria were meaningful or effective, a test of independence of principles of classification was performed. Each response to each category of answer to Question 5 (b) was paired with its respective Juror Usage Index. Then responses and their corresponding Juror Usage Indexes were divided into two categories, those having above-average Juror Usage Indexes and those having below-average Juror Usage Indexes.

The contingency table which resulted is shown in Figure 17. The numbers inside the table represent the total number of responses in that category. For example, there were a total of eleven "yes" responses to Question 5 (b). Of those eleven, six had below-average Juror Usage Indexes and five had above-average Juror Usage Indexes. Similarly, there were 68 no responses for Question 5 (b). Of those 68, 44 had below-average Juror Usage Indexes, and 24 had above-average Juror Usage Indexes. Therefore, the number in each classification or cell is the observed frequency. The numbers at the bottom of the table are the total number of responses to each of the possible categories of answers or "treatment." The numbers at the right hand side of the table represent the total number of responses with corresponding Juror Usage Indexes in the two categories. A total of 79 responses were provided for Question 5 (b). This number is not the same as the total number of questionnaires returned. Some courts did not indicate a response to Question 5 (b).

The hypothesis that the two principles of classifications--the response to Question 5 (b) and Juror Usage Index--are independent

FIGURE 17  
RESPONSES TO QUESTION 5B

	Yes	No	
Below Average Juror Usage Index	6	43	49
Above Average Juror Usage Index	5	25	30
	11	68	79

$$\chi^2 = (\text{EXP.} - \text{OBS})^2 / \text{EXP}$$

$\chi^2$  Empirical = 0.3036 - not significant at five percent level  
with one Df.

Conclusion: There is no relationship between the response to  
Question 5(b) and the Juror Usage Index.

was tested. The expected frequency for each cell was computed so that all of the totals were the same as the actual observations and the frequency of each of the ten cells was proportional to the total. The sample total of Chi-square was found to be 0.3036. This value is not significant at the five percent level with one degree of freedom. The hypothesis is, therefore, accepted. The principles of classification are independent. There is no relationship between the response to Question 5 (b) and the Juror Usage Index.

#### Analysis of "Extreme" Cases of Juror Utilization

An analysis of the Court Management Statistics identified the Western District of Michigan and the Southern District of New York as extreme cases of juror utilization. An analysis was made in an attempt to determine the cause of these extreme cases of juror utilization. This section is divided into four parts. First, a brief description of the operation of the Southern District court is presented. Second, a description of the Western District of Michigan court is presented. Third, some of the differences between the courts' methods of utilizing jurors are identified. Fourth, a hypothesis regarding the relative utilization for districts using a "multiple voir dire approach" was tested.

#### Description of the Southern District of New York Court

A description of the jury selection process and the Juror Management System used in the Southern District of New York was presented in Chapter II, page 23-28. The court summons a jury pool for a two week period. When a case is ready to be heard, jurors are drawn from the



jury pool and are sent to the voir dire. After the voir dire is completed, the actual trial starts. At any one time, there theoretically exists the possibility of each of the judges in the court requesting a panel of jurors for a voir dire. Consequently, the number of jurors maintained in the jury pool is quite large.

The Southern District of New York had the fifth largest number of cases pending per judgeship in the nation. The number of trials per judge was slightly less than one-half of the national average. The percentage of civil cases more than three years old and of criminal defendants pending more than one year is twice the average national percentage for these types of cases. Additionally, the Juror Usage performance rates are the poorest of all districts.<sup>5</sup>

#### Description of The Western District of Michigan Court

The Western District of Michigan operates in a different fashion. The court schedules multiple jury drawings at one time. As many as eighteen or twenty cases are often set for jury selection on a given day, with the selected juries then held on call until actual trial occurs at a future date. In this situation, virtually all the venireman are used at least once with most of them selected several times. The court believes that one consequence of this approach is the encouragement of serious settlement negotiations due to the formal setting of a jury selection date. The Western District of Michigan finds that at least fifty percent of the cases set for jury selection are settled within two or three weeks of that date.<sup>6</sup> The Western

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<sup>5</sup>"Management Statistics for United States Courts," op. cit., section 2-4.

<sup>6</sup>This description was provided by Mr. Robert R. Reinhard, Jr., law clerk to Judge Noel Fox, in a letter dated May 9, 1972.

District of Michigan is a relatively small court having only two full time judges.

The Western District of Michigan had the second highest filings growth rate in the sixth circuit over recent years. The number of filings, the number of pending cases, the weighted case load, and the number of terminations per judgeship have all increased sharply since 1968. The civil filings and weighted case load per judge are above national averages by modest amounts. The median time from filing to disposition for both civil and criminal trials are the third shortest in the sixth district. The court's juror utilization is among the best in the country.<sup>7</sup>

#### Differences Between the Two Courts

Several differences between these two courts are obvious. First, the Southern District of New York is the largest in the United States District Court System.<sup>8</sup> The Western District of Michigan is a relatively small court. Second, since the Southern District of New York represents geographically the city of New York, its large urban environment contrasts to the considerably less urban environment of Grand Rapids and the rural environment and the rest of the Western District of Michigan. The effects of these first two differences upon the utilization of jurors were not investigated. Both their size and the urban vs. rural differences represent uncontrollable factors.

Third, the "multiple voir dire" approach contrasts to the more standard jury pool approach taken by the Southern District of New York.

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<sup>7</sup>"Management Statistics for United States Courts," op. cit., section 6-4.

<sup>8</sup>The criteria used is the number of judgeships authorized for the district.

Fourth, the arbitration process utilized by the Western District of Michigan is not explicitly undertaken by the Southern District of New York.

Effectiveness of the "Multiple  
Voir Dire"

The comparison of the Southern District of New York and the Western District of Michigan pointed to several differences between these two courts. The multiple voir dire approach taken by the Western District of Michigan was chosen for comparison with the more "conventional" jury pool approach taken by the Southern District of New York. This difference was chosen for analysis because it represented a controllable difference. That is, if a court chose to use a multiple voir dire approach, it could do so. The size difference between the two courts represents an uncontrollable factor. Similarly, the urban vs. rural jurisdictional difference is uncontrollable. The "arbitration" process undertaken by the Western District of Michigan was not chosen for two reasons. First, if a court decides to encourage early settlement by this "arbitration" process, it may do so to differing degrees. This varying degree of involvement could logically cause significantly different effects. Second, the court does not always have the resources, time, or support of the Bar in such "arbitration" efforts.

The effectiveness of the multiple voir dire approach as compared with other approaches was tested. The hypothesis tested was that courts which use the multiple voir dire approach have Juror Usage Indexes which are not significantly different than the Juror Usage Index of courts using other approaches. This hypothesis was tested in two ways. Question 8 of the questionnaire sent to all 93 districts

asked each court to identify and describe any approach which it takes to improve juror utilization. The questionnaires that were returned were sorted according to whether the court stated that it used the multiple voir dire approach. The multiple voir dire approach was identified in numerous ways on the questionnaire.

The hypothesis was tested in two ways. First, a test of significance of classification was performed. Second, the same data were analyzed using analysis of variance.

#### Analysis of principles of classification

The courts represented by the returned questionnaire were divided into two categories: (1) those which stated that they used a multiple voir dire approach and, (2) those which did not. In order to determine whether the classification criterion was meaningful or effective, a test of the independence of the principle of classification was performed. Those courts which stated that they used a multiple voir dire approach were paired with their respective Juror Usage Index. Similarly, those courts which did not state that they used a multiple voir dire approach were paired with their respective Juror Usage Indexes. Then, the responses and their corresponding Juror Usage Index were divided into two categories, those having above-average Juror Usage Indexes and those having below average Juror Usage Indexes.

The contingency table which resulted is shown in Figure 18. The numbers in the table represent the total number of responses in that category. For example, there was a total of twenty questionnaire responses which indicated that the court used a multiple voir dire approach. Of those twenty questionnaires, eighteen had below-average

FIGURE 18  
ANALYSIS OF QUESTIONNAIRE RESPONSES

	No. of Questionnaire Responses Indicating Use of the Multiple Voir Dire	No. Not Indicating Use of Multiple Voir Dire	
Below Average Juror Usage Index	18	42	60
Above Average Juror Usage Index	2	34	36
	20	76	96

$$\chi^2 = (\text{EXP} - \text{OBS})^2 / \text{EXP}$$

$$\chi^2_{\text{Empirical}} = 8.15$$

Therefore there is a relationship between whether or not a court uses the multiple voir dire approach and its Juror Usage Index.

Juror Usage Indexes and two had above-average Juror Usage Indexes. Similarly, 76 courts did not indicate that they used the multiple voir dire approach. Of those 76, 42 had below-average Juror Usage Indexes and 34 had above-average Juror Usage Indexes. Therefore, the number in each classification or cell is the observed frequency. The numbers at the bottom of the table are the total number of responses to both of the possible categories or "treatment." The numbers at the right hand side of the table represent the total number of responses with corresponding Juror Usage Indexes in the two categories. A total of 96 questionnaires were analyzed.

The hypothesis that the two principles of classification--whether the court used a multiple voir dire approach and the Juror Usage Index--are independent was tested. The expected frequency for each cell was computed so that all the totals were the same as the actual observations and the frequency of each of the four cells was proportional to total. The sample value of Chi-square was found to be 8.15. This value is significant at the one percent level with one degree of freedom. The hypothesis is therefore rejected at the one percent level. The principles of classification are not independent. There is a relationship between whether the court uses the multiple voir dire approach and its Juror Usage Index.

Since more than one questionnaire was sent to some courts (on the basis of the number of subdivisions within the district) the same analysis was performed using the district data as opposed to the number of questionnaire responses. This means that those districts which responded to more than one questionnaire were considered as one response. The contingency table which resulted is shown in Figure 19. The numbers

FIGURE 19  
ANALYSIS OF DISTRICTS RESPONDING

	No. of Districts Indicating Use of the Multiple Voir Dire	No. Not Indicating Use of the Multiple Voir Dire	
Below Average Juror Usage Index	15	30	45
Above Average Juror Usage Index	1	25	26
	16	55	71

$$\chi^2 = (\text{EXP} - \text{OBS})^2 / \text{EXP}$$

$$\chi^2_{\text{Empirical}} = 8.21$$

Therefore there is a relationship between whether or not a court uses the multiple voir dire approach and its Juror Usage Index.

in the table represent the total number of courts in that category. These data were analyzed in the same manner as the data contained in Figure 19.

The hypothesis that the two principles of classification--whether they used a multiple voir dire approach and the Juror Usage Index--are independent was tested. The expected frequency for each cell was computed so that all the totals were the same as the actual observations and the frequency of each of the four cells was proportional to the total. The sample value of Chi-square was found to be 8.21. This value is significant at the one percent level with one degree of freedom. The hypothesis is therefore rejected. This result is the same as that found using the number of questionnaires in each category as opposed to the number of districts. That is, the principles of classification are not independent. There is a relationship between whether the court uses a multiple voir dire approach and the Juror Usage Index.

Question 8 was open-ended. That is, each court was asked to identify and/or describe any approach which it takes to improve utilization of jurors. Consequently, it is possible that courts which did not indicate they used the multiple voir dire approach might in fact, use the approach. However, when the questionnaire was designed the possible effectiveness of the multiple voir dire approach had not been anticipated.

#### Analysis of variance.

The relative effectiveness of the multiple voir dire approach as compared to the more "conventional" approaches was evaluated using analysis of variance. The hypothesis that was tested stated: "No



FIGURE 20  
ANALYSIS OF VARIANCE - JUROR USAGE INDEX

	Courts Using the Multiple Voir Dire Approach	Courts Not Using the Multiple Voir Dire Approach
Number Responding	15	55
Mean Juror Usage Index	19.29	23.22
Standard Deviation	3.61	5.35

	Sum of Squares	Df	Mean Square	F
Between Groups	181.98	1	181.98	7.15*
Within Groups	1730.77	68	25.45	
Total	1912.75			

\*Significant at F (0.05, 1, 68)

Therefore there is a significant difference between the Juror Usage Index of courts using the multiple voir dire approach and those not using it.

FIGURE 21

## ANALYSIS OF VARIANCE - PERCENTAGE OF UNUSED JURORS

	Courts Using the Multiple Voir Dire Approach	Courts Not Using the Multiple Voir Dire Approach
Number Responding	15	55
Mean Juror Usage Index	34.67	45.26
Standard Deviation	10.00	9.83

	Sum of Squares	Df	Mean Square	F
Between Groups	1321.37	1	1321.37	13.58
Within Groups	6614.68	68	97.27	
Total	7936.04			

\*Significant at F (0.05, 1, 68)

Therefore there is a significant difference between the percentage of unused jurors of courts using the multiple voir dire approach and those not using it.

significant difference exists in the Juror Usage Indexes between courts using the multiple voir dire approach and the other courts." This hypothesis was tested at the five percent level using analysis of variance. Figure 19 represents the results of this analysis. The empirical F value, 7.15, is greater than 3.99, the significant value of  $F(0.05, 1, 68)$ . The hypothesis that the mean Juror Usage Index for courts using the multiple voir dire approach is equal to the mean Juror Usage Index for courts using other approaches is rejected. There is a significant difference in the mean Juror Usage Indexes.

A similar hypothesis that: "No significant difference exists in the percentage of unused jurors between courts using the multiple voir dire approach and the other courts was tested." This hypothesis was tested at the five percent level of significance using analysis of variance. Figure 20 presents the results of this analysis. The empirical F value, 13.58, is greater than 3.99, the significant value of  $F(0.05, 1, 68)$ . The hypothesis that the mean percentage of unused jurors for courts using the multiple voir dire approach is equal to the mean percentage of unused jurors for courts using other approaches is rejected. There is a significant difference in the mean percentage of unused jurors.

#### Summary

The purpose of this chapter was to explain the analysis used to obtain information as to the existence of better juror management approaches.

As a result of the comparative analysis, there is a strong suggestion that juror utilization could be increased significantly if the court adopted the "multiple voir dire" approach. Additionally,

comparative analysis indicates that juror utilization decreases in those situations where the court faces an increased backlog of cases.

Based upon the results of the comparative analysis, the effectiveness of the "multiple voir dire" approach to juror management is tested using the simulation model developed in Chapter V.

## CHAPTER V

### TESTING THE SIMULATION MODEL

This chapter is divided into four sections. The first describes the development of the basic model used for the test of Hypothesis (3). The second section presents the actual results achieved in the simulation of a "typical" Federal District Court system. The third section presents the results of the simulation performed with the basic model modified as suggested by the comparative analysis presented in Chapter IV. The fourth section presents an analysis of the differences observed between the original simulation and the simulation using an alternative juror management approach.

#### Development of the Basic Model

The task of determining the effects of modifications in a typical juror management system is a complex one. The variables involved are many. The relationships that exist are complex in many cases. Basically because of the complexity of the system being described, the model constructed was a simulation model. The basic complexity of this system exists because of the interdependency of several subsystems which make an analytic solution very difficult, if not impossible.

#### Characteristics of Simulation Models

A simulation model of the scale anticipated is practical only with the use of a digital computer. Basically the simulation model is a mathematical representation of some real-world system. The model

represents some abstraction from the real-world situation. However, in most situations, simulation by computer allows the modeler to compress the time of occurrence of projected changes into short intervals of present time. Thus the modeler is able to test the effects of these proposed changes upon the real-world system before they are actually implemented on the "real" system. Many of the inputs to the real-world Federal District Court Juror Management system are probabilistic in nature. Such factors as the duration of the voir dire, the duration of the trial, the number of challenges exercised, the number of jurors who will request excuses, and the size of the jury that ultimately hears the case are all probabilistic in nature. These phenomena can be simulated in a simulation model by the Monte Carlo method. This is the name given to "simulation by sampling." Using the Monte Carlo method, the desired probability distribution is used in conjunction with a table of random numbers to make random selections from the population of the appropriate random variable. These selected values of the random variable are then entered into the simulation model. Since the simulation model is in fact a mathematical model of the logical relationships which exist in the real-world situation, the effects of these random variations can be observed in the output of the model. All of the complex inter-relationships of the courts' use of jurors are taken into account concurrently. Because of these characteristics, simulation can be used to answer the "what if" type of question concerning the system which is modeled.

#### The Simulation Language

In order to write a simulation program to model the real-world court system it was necessary to choose a particular computer language.

The International Business Machines (IBM) General Purpose Simulation System (GPSS) is a computer program developed for the purpose of conducting evaluations and experiments on systems, methods, processes, and designs. GPSS is a simulation language developed by IBM for the purposes of simplifying the process of writing simulation programs. There are three parts to GPSS:

- (1) The simulation language. The model maker describes the actual situation with flowcharts and notation. This visual representation permits other people to understand the structure of the model with a minimum of effort.
- (2) Rules and procedures. As with any language there must be (a) consistent approach to its use. The rules and procedures insure that each model constructed will be in the same phraseology and format. In addition to aiding man/ model understanding, this consistent approach is necessary for computer operation.
- (3) The simulation program. IBM supplies a simulation program for many of its computers that can act upon the model written in simulation language and converted to cards. The model and the simulation program act together to form the computer model and the means to control and operate it. The result is a computer model that reflects the actual situation and operates with behaviors similar to the actual situation. The simulation program also collects and prints out statistical data for analysis.<sup>1</sup>

The GPSS program is built around a set of simple entities, divided into four classes: dynamic, equipment, statistical, and operational.

The dynamic entities in GPSS are called "transactions." These represent units of traffic, such as cases flowing through the court system. They are "created" and "destroyed" as required during the simulation run, and can be thought of as moving through the system causing actions to occur. Associated with each transaction are parameters

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<sup>1</sup>Introduction to Simulation by Computer -- A Management Tool in Decision Making, IBM Data Processing Application. (White Plains, New York; IBM February, 1970) p. 10.

which can be assigned values by the user to represent characteristics of the transaction. For example, a transaction representing a case might carry its "intrinsic" voir dire and trial duration as two of its parameters. These numbers could then be used in the simulator logic to determine how long the voir dire and the case will take.

Entities of the second class represent elements of the system equipment that are acted upon by transactions. These are facilities, storages, and logic switches. A facility can handle only one transaction at a time, and could represent a court room. It represents a potential bottleneck. A storage can handle several transactions concurrently, and could be used to represent the jury pool. A logic switch is a two-state indicator which can be set by one transaction to modify the flow of other transactions. Logic switches could be arranged so as to represent the jury clerk who monitors the flow of jurors to the different courts.

In order to measure system behavior, two types of statistical entities are defined: queues and tables. Each queue maintains a list of transactions delayed at one or more points in the system, and keeps a record of the average number of transactions delayed and the length of these delays. A table may be used to collect any sort of frequency distribution desired. These two entities provide the major portion of GPSS output.

The operational entities, called "blocks," constitute the fourth and final class. Like the blocks of a diagram, they provide the logic of a system, instructing the transactions where to go and what to do next. These blocks, in conjunction with the other three classes of entities identified above, constitute the language of GPSS.



To provide input for the simulation, control and definition cards are prepared from a flowchart of the system. This constitutes the model in GPSS language. Once the system model is loaded, the GPSS program generates and moves transactions from block to block according to timing information and logical rules incorporated in the blocks themselves. Each movement is designed to occur at some particular point of time. The program automatically maintains a record of these times and executes the movements in their correct time sequence. Where actions cannot be performed at the originally scheduled time -- for example when the required facility is already in use -- the processing temporarily ceases for that transaction. The program automatically maintains a status of the condition causing the delay, and as soon as it changes, the transaction is activated again.

This sequence of events is controlled by a simulated clock that records the current time reached in the modeled system. Values shown by this clock are referred to as clock time. The unit of simulator clock time representing a unit of system time is designated by the user in the model developed. In this dissertation, the basic time unit is one minute.<sup>2</sup>

#### Description of the Model

The simulation model developed represents a court with four judges. The model assumes that there are enough physical facilities for all judges to be occupied at the same time. This assumption takes into account such things as judges chambers, court rooms, juror waiting rooms,

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<sup>2</sup>This material describing GPSS is adapted from material contained in "General Purpose Simulation System/360, Application Description Manual" IBM: October 1969, fourth edition.

clerks, and court reporters. The model of the court could easily be expanded to represent any number of judges. The specific means for the "expansion" of the model are presented later in this chapter. The overall flowchart of the system being simulated was described in Figure 3, page 50. The flowchart for the simulation model is considerably more complex.

The model which was developed can best be understood by examining the flowchart in Figure 22. The block types used in GPSS/360 and their corresponding block symbols are given in Appendix B.

Examination of the model shows that the section of the flowchart which starts with the seizing of a court room for a voir dire through the termination of a case is similar for all four courts. Consequently, part of the flowchart is essentially repeated for each of the four court-rooms.

In the model that was generated to represent the current system, jurors were first generated. Initially, 120 jurors were generated (Block 1). The entities generated then proceeded to a "storage" which represented the jury pool (Block 2). These jurors remained in the pool until they were summoned for a voir dire or a trial. The 120 jurors that were generated were "created" at the same time and entered the jury pool at the beginning of the simulation.

A group of cases were generated at the same time as the jurors. Initially, fifty cases were generated for the docket (Block 4). After these cases were generated, they were placed on the case docket. The case docket was represented by Queue #1. The cases that entered the docket were kept there until the jury clerk determined that the conditions were right for sending a number of jurors to a courtroom. The function

FIGURE 22

SIMULATION FLOWCHART  
CONVENTIONAL JURY POOL APPROACH

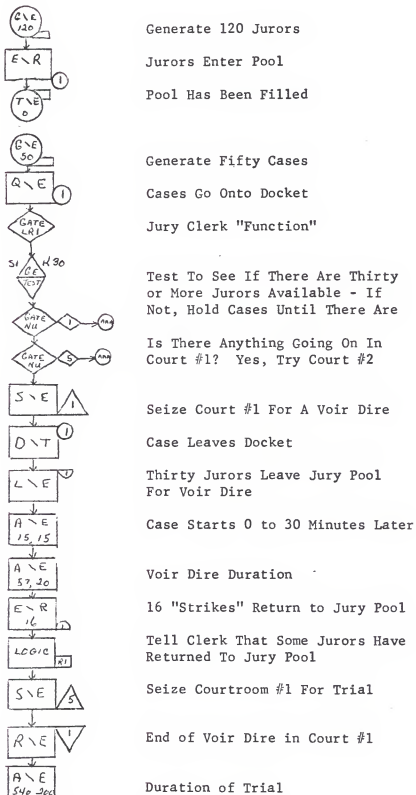
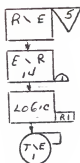


FIGURE 22 (Cont.)



Release Courtroom #1

14 Jurors Return to Jury Pool

Tell Jury Clerk That Some Jurors  
Have Returned To Jury Pool

Terminate Case

which the jury clerk provided was simulated by the use of a "gate" block (Block 6). The "gate" was "closed" when a particular logical condition existed in the simulation. Initially, at the start of the simulation, the logical condition was such that the gate was open. The "gate" clock served to keep the jurors in the jury pool and the cases on the docket until they could be tried. The logical condition which determined whether cases could leave the docket and whether jurors could leave the jury pool was determined by the logical condition of Logic Switch #1. The purpose of this Logic Switch can be better understood after examining the model further.

Jurors were allowed to leave the jury pool and cases were tried only after there were at least enough jurors available to hear the voir dire. Hence, the simulation model next tested for the availability of at least thirty jurors in the jury pool. The thirty man voir dire was used because this number represents an approximation of the panel size for a typical case (either criminal or civil) in the Federal District Court system.<sup>3</sup>

<sup>3</sup>The best estimate of the number of jurors placed on a panel for a non-capital criminal case was 33 according to the results of the jury questionnaire. The best estimate of the number of jurors empanelled for a civil voir dire was 21.

In the simulation model, the check of the availability of thirty jurors in the jury pool was performed by a "test" block (Block 7). This test block compared the number of entities (jurors) in Storage #1 to the fixed panel size (thirty).

Similarly, in the simulation model, if there was a voir dire taking place in one of the courtrooms, the availability of other courts was checked. Specifically, if there was a voir dire taking place in Courtroom #1, the clerk checked to see if Court #2 was available (Block 27). Then if Court #2 was occupied, the clerk checked to see whether Court #3 was available (Block 46). If Court #4 was not available, and each of the other courtrooms was occupied, no cases were taken off the docket nor were any jurors summoned from the jury pool. The simulation model checked to see if there was a voir dire or a trial taking place in a particular court. If there was no voir dire or trial taking place in the court, the jury clerk took a case off the docket and seized the courtroom for the case. In the simulation model the courtrooms were represented by "facilities 1, 2, 3, and 4." In the simulation model, the facility was seized for a voir dire and then a case was removed from the docket (Queue #1) (Blocks 10, 29, 48, 67). The case was taken off the docket by use of a "depart" block (Blocks 11, 30, 49, 68). Each of the blocks described up to this point do not cause the simulator's clock to move. That is, as far as the simulation is concerned, passage of the entities from block to block does not require any time. In order to simulate the passage of time, the "advance" block was used.

In the simulation model, a random period of time elapsed between the availability of a courtroom and the start of a voir dire. The model constructed simulated this delay as being described by a uniform distribution with a mean of fifteen minutes and a range of thirty minutes. This

means that the voir dire started at some time between zero to thirty minutes after the availability of a courtroom (Blocks 13, 32, 51, 70). Each of the time delays between zero and thirty minutes was equally likely. A panel of jurors was sent to the courtroom for a voir dire as soon as the voir dire was ready to start. The thirty jurors necessary for the voir dire were removed from the jury pool (Storage #1) by the use of a "leave" block (Blocks 12, 31, 50, 69). The B operand of this "leave" block was thirty. This caused thirty jurors to be removed from the jury pool (Storage #1).

The duration of the voir dire was simulated by the use of an "advance" block (Blocks 15, 34, 53, 72). The duration of the voir dire was simulated as a uniform random variable. The mean of this random variable was 57 minutes.<sup>4</sup> The range of the duration of the voir dire was forty minutes. This means that the simulation model simulated the duration of the voir dire to be between 37 minutes and 77 minutes. Each of the times between 37 and 77 minutes was equally likely.

After the voir dire was completed, the "strikes" returned to the jury pool. The "strikes" included those jurors who were challenged both for cause and peremptorily. Strikes also included all the other jurors who reported for the voir dire but were not required for the actual trial. In the simulation model constructed, there were sixteen strikes. These jurors were returned to the jury pool by the use of the "enter" block (Blocks 16, 35, 54, 73). As these jurors returned to the jury pool, they reset the status of Logic Switch #1. The significance of this change in status comes from the increase in the number of jurors in the jury pool. If for some reason there were an insufficient number

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<sup>4</sup>Pabst, p. 46.

of jurors in the jury pool, or all of the courts were occupied with either a voir dire or a trial, Logic Switch #1 would be placed in the "set" condition. The return of the sixteen strikes to the jury pool signified the completion of a voir dire and the availability of previously unavailable jurors for usage.

After the voir dire was completed, the courtroom was seized for the trial (Blocks 19, 38, 57, 76). In the simulation model, the case actually moved from one facility to another facility. However, this movement took place only for the purpose of keeping track of the amount of the courtroom time consumed in the different usages of the courtroom. Consequently, the case seized the courtroom for a trial and simultaneously released the courtroom from its usage for a voir dire.

The duration of the trial was simulated by the use of an "advance" block (Blocks 21, 40, 59, 78). The duration of the trial was simulated as a uniform random variable with a mean of 540 minutes.<sup>5</sup> The range of the duration of the trial was 400 minutes. In the simulation model, the trial lasted from 340 minutes to 740 minutes.

After the trial was completed, the courtroom facility was returned to "available" status. The entity (case) released the facility by the use of a "release" block (Blocks 22, 41, 60, 79). At the end of the trial, the jurors were returned to the jury pool. This was simulated by the use of an "enter" block (Blocks 23, 42, 61, 80). The "enter" block caused fourteen jurors to return to the jury pool (Storage #1). Additionally, the simulation model caused the condition of Logic Switch #1 to be reset. This indicated to the jury clerk that jurors had returned to the jury pool. The change in status for the Logic Switch

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<sup>5</sup>Pabst, p. 52.

was necessary to indicate the availability of the courtroom and additionally, the availability of fourteen additional jurors.

Simultaneously with the completion of the case, the return of the jurors to the jury pool, and the change in the status of Logic Switch #1 (signifying the completion of the trial), the case was terminated (Blocks 26, 45, 64, 83).

A complete listing of the program written is shown in Figure 23. A brief explanation of the function of each of the operations is shown to the right of the operation name and its operands.

Simulation Results -- "Conventional"  
Jury Pool

The model of a court system with a "conventional" jury pool was run for a total of five simulated dockets of the court system. That is, five dockets, each of which had fifty cases on them, were simulated. With a jury pool of 120, a total of 40,308 minutes of simulated time was required to hear the five dockets of cases (250 cases).

This simulation was run first with 120 jurors in the jury pool. In order to test the effect of reducing the number of jurors upon the total time required to hear the cases, the size of the jury pool was reduced. This was done by decreasing the number of jurors that were initially introduced into the jury pool. The initial decreases had very little effect on the total duration of the five dockets of fifty cases. However, as the number of jurors in the jury pool was reduced, the duration of the five dockets eventually increased.

Each reduction in the number of jurors in the jury pool caused a decrease in the total fees paid to jurors. The number of jurors in the jury pool was reduced in increments of ten. That is, initially the



FIGURE 23

PARTIAL LISTING OF GPSS PROGRAM--  
CONVENTIONAL JURY POOL SYSTEM

BLOCK NUMBER	*LOC	OPERATION STIMULATE	A,B,C,D,E,F,G	COMMENTS	CARD NUMBER
	*				1
	*				2
	*				3
	*				4
	*	* THIS SIMULATION IS A MODEL OF A "CONVENTIONAL" COURT			
	*	* WITH FOUR JUDGES AND A JURY POOL OF 120 JURORS			
	*				6
	*				7
	*				8
	*				9
1	1	TABLE	1,20,20,20		10
2	ABC	GENERATE	,,,120		11
3		ENTER	1	JURORS ENTER JURY POOL	12
		TERMINATE	0		13
	*				14
4		GENERATE	,,,50	GENERATE 50 CASES	15
5		QUEUE	1	CASES PUT ON DOCKET	16
6	QQQ	GATE LR	1	"JURY CLERK" FUNCTION	17
7		TEST GE	S1,K30	ARE THERE AT LEAST 30 JURORS IN THE JURY POOL?	18
	*				19
8		GATE NU	1,AAA	VOIR DIRE IN COURTROOM NO. 1? YES, TRY COURT NO.2	20
9		GATE NU	5,AAA	TRIAL IN COURTROOM NO.1? YES. TRY COURT NO. 2	21
10		SEIZE	1	SEIZES COURTROOM NO.1	22
11		DEPART	1	CASE DEPARTS DOCKET	23
12		LEAVE	1,30	PANEL OF 30 SENT TO VOIR DIRE IN COURT NO.1	24
13		ADVANCE	15,15	VOIR DIRE STARTS IN 0 TO 30 MINUTES	25
14		TABULATE	1		26
15		ADVANCE	57,20	DURATION OF VOIR DIRE	27

FIGURE 23--Continued

BLOCK NUMBER	*LOC	OPERATION	A,B,C,D,E,F,G 1,16	COMMENTS	CARD NUMBER
16		ENTER	1,16	STRIKES RETURN TO JURY POOL	28
17		TABULATE	1		29
18		LOGIC R	1	TELL JURY CLERK THAT VOIR DIRE IS OVER	30
19		SEIZE	5	SEIZE COURTROOM NO. 1 FOR TRIAL	31
20		RELEASE	1	COMPLETION OF VOIR DIRE IN COURTROOM NO.1	32
21		ADVANCE	540,200	DURATION OF TRIAL	33
22		RELEASE	5	RELEASE COURTROOM NO 1	34
23		ENTER	1,14	JURY RETURNS TO JURY POOL	35
24		TABULATE	1		36
25		LOGIC R	1	TELL JURY CLERK THAT TRIAL IS OVER	37
26		TERMINATES	1	TERMINATE CASE	38
	*				39
27		GATE NU	2,BBB	VOIR DIRE IN COURTROOM NO.22 YES TRY COURT NO.3	40
28	AAA	GATE NU	6,BBB	TRIAL IN COURTROOM NO. 2 ? YES, TRY COURT NO. 3	41
29		SEIZE	2	SEIZES COURTROOM NO .2 FOR A VOIR DIRE	42
30		DEPART	1	CASE DEPARTS DOCKET	43
31		LEAVE	1,30	PANEL OF 30 SENT TO VOIR DIRE IN COURT NO. 2	44
32		ADVANCE	15,15	VOIR DIRE STARTS IN 0 TO 30 MINUTES	45
33		TABULATE	1		46
34		ADVANCE	57,20	DURATION OF VOIR DIRE	47
35		ENTER	1,16	STRIKES RETURN TO JURY POOL	48
36		TABULATE	1		49
37		LOGIC R	1	TELL JURY CLERK THAT VOIR DIRE IS OVER	50
38		SEIZE	6	START OF TRIAL IN COURTROOM NO. 2	51
39		RELEASE	2	COMPLETION OF VOIR DIRE	52
40		ADVANCE	540,200	DURATION OF TRIAL	53
41		RELEASE	6	COMPLETION OF TRIAL IN COURTROOM NO. 2	54
42		ENTER	1,14	JURY RETURNS TO JURY POOL	55
43		TABULATE	1		56
44		LOGIC R	1	TELL JURY CLERK THAT TRIAL IS OVER	57
45		TERMINATE	1	TERMINATE CASE	58
	*				59
46		GATE NU	3,CCC	VOIR DIRE IN COURTROOM NO.3? YES, TRY COURT NO.4	60

FIGURE 23--Continued

BLOCK NUMBER	*LOC	OPERATION	A, B, C, D, E, F, G	COMMENTS	CARD NUMBER
47		GATE NU	7, CCC	TRIAL IN COURTROOM NO. 3 ? YES, TRY COURT NO. 4	61
48		SEIZE	3	SEIZES COURTROOM NO. 3 FOR A VOIR DIRE	62
49		DEPART	1	CASES DEPARTS DOCKET	63
50		LEAVE	1,30	PANEL OF 30 SENT TO VOIR DIRE IN COURT NO. 3	64
51		ADVANCE	15,15	VOIR DIRE STARTS IN 0 TO 30 MINUTES	65
52		TABULATE	1		66
53		ADVANCE	57,20	DURATION OF VOIR DIRE	67
54		ENTER	1,16	STRIKES RETURN TO JURY POOL	68
55		TABULATE	1		69
56		LOGIC R	1	TELL JURY CLERK THAT VOIR DIRE IS OVER	70
57		SEIZE	7	START OF TRIAL IN COURT NO.3	71
58		RELEASE	3	END OF VOIR DIRE	72
59		ADVANCE	540,200	DURATION OF TRIAL	73
60		RELEASE	7	COMPLETION OF TRIAL IN COURT NO. 3	74
61		ENTER	1,14	JURY RETURNS TO JURY POOL	75
62		TABULATE	1		76
63		LOGIC R	1	TELL JURY CLERK THAT TRIAL IS OVER	77
64		TERMINATE	1	END OF CASE IN COURTROOM NO. 3	78
	*				79
65		GATE NU	4,DDD	VOIR DIRE IN COURTROOM NO. 4?	80
	*			YES, TELL JURY CLERK	81
66		GATE NU	8,DDD	TRIAL IN COURTROOM NO. 4? YES, TELL JURY CLERK	82
67		SEIZE	4	SEIZES COURTROOM NO. 4 FOR A VOIR DIRE	83
68		DEPART	1	CASE DEPARTS DOCKET	84
69		LEAVE	1,30	PANEL OF 30 SENT TO VOIR DIRE IN COURT NO. 4	85
70		ADVANCE	15,15	VOIR DIRE STARTS 0 TO 30 MINUTES LATER	86
71		TABULATE	1		87
72		ADVANCE	57,20	DURATION OF VOIR DIRE	88
73		ENTER	1,16	STRIKES RETURN TO JURY POOL	89
74		TABULATE	1		90
75		LOGIC R	1	TELL JURY CLERK THAT VOIR DIRE IS OVER	91
76		SEIZE	8	START OF TRIAL IN COURT NO. 4	92
77		RELEASE	4	END VOIR DIRE	93
78		ADVANCE	540,200	DURATION OF TRIAL	94

FIGURE 23--Continued

BLOCK NUMBER	*LOC	OPERATION	A, B, C, D, E, F, G COMPLETION OF TRIAL IN COURT NO. 4 JURY RETURNS TO JURY POOL	COMMENTS	CARD NUMBER
79		RELEASE	8		95
80		ENTER	1, 14		96
81		TABULATE	1		97
82		LOGIC R	1	TELL JURY CLERK THAT TRIAL IS COMPLETED	98
83		TERMINATE	1	TERMINATE CASE	99
	*				100
84	DDD	LOGIC S	1	ALL COURTS USED, SEND NO JURORS UNTIL A TRIAL	101
	*			OR VOIR DIRE IS COMPLETED	102
85		TRANSFER	,QQQ		103
	*				104
	1	STORAGE	120		105
	*				106
		START	50		107
		CLEAR			108
		START	50		109
		CLEAR			110
		START	50		111
		CLEAR			112

FIGURE 23--Continued  
PARTIAL LISTING OF PROGRAM OUTPUT

RELATIVE CLOCK		8131 ABSOLUTE CLOCK				8131								
BLOCK	COUNTS	TOTAL	BLOCK	CURRENT	TOTAL	BLOCK	CURRENT	TOTAL	BLOCK	CURRENT	TOTAL	BLOCK	CURRENT	TOTAL
1	0	120	11	0	13	21	0	13	31	0	12	41	0	12
2	0	120	12	0	13	22	0	13	32	0	12	42	0	12
3	0	120	13	0	13	23	0	13	33	0	12	43	0	12
4	0	50	14	0	13	24	0	13	34	0	12	44	0	12
5	0	50	15	0	13	25	0	13	35	0	12	45	0	12
6	0	227	16	0	13	26	0	13	36	0	12	46	0	202
7	0	227	17	0	13	27	0	214	37	0	12	47	0	145
8	0	227	18	0	13	28	0	140	38	0	12	48	0	12
9	0	162	19	0	13	29	0	12	39	0	12	49	0	12
10	0	13	20	0	13	30	0	12	40	0	12	50	0	12

BLOCK	CURRENT	TOTAL	BLOCK	CURRENT	TOTAL	BLOCK	CURRENT	TOTAL	BLOCK	CURRENT	TOTAL
51	0	12	61	0	12	71	0	13	81	0	13
52	0	12	62	0	12	72	0	13	82	0	13
53	0	12	63	0	12	73	0	13	83	0	13
54	0	12	64	0	12	74	0	13	84	0	177
55	0	12	65	0	190	75	0	13	85	0	177
56	0	12	66	0	117	76	0	13			
57	0	12	67	0	13	77	0	13			
58	0	12	68	0	13	78	0	13			
59	0	12	69	0	13	79	0	13			
60	0	12	70	0	13	80	0	13			

FIGURE 23--Continued

FACULTY	AVERAGE UTILIZATION	NUMBER ENTRIES	AVERAGE TIME/TRAN	SEIZING TRANS. NO.	PREEMPTING TRANS. NO.		
1	.120	13	75.076				
2	.099	12	67.333				
3	.100	12	68.000				
4	.122	13	76.538				
5	.848	13	530.769				
6	.835	12	565.916				
7	.869	12	589.333				
8	.870	13	544.538				
STORAGE	CAPACITY	AVERAGE CONTENTS	AVERAGE UTILIZATION	ENTRIES	AVERAGE TIME/TRAN	CURRENT CONTENTS	MAXIMUM CONTENTS
1	120	58.782	.489	1620	295.038	120	120
QUEUS	MAXIMUM CONTENTS	AVERAGE CONTENTS	TOTAL ENTRIES	PERCENT ZEROS	AVERAGE TIME/TRAN	SAVERAGE TIME/TRANS	TABLE NUMBER
1	49	22.831	50	1.9	3712.919	3788.693	CURRENT CONTENTS
SAVERAGE TIME/TRANS = AVERAGE TIME/TRANS EXCLUDING ZERO ENTRIES							
ENTRIES IN TABLE	MEAN ARGUMENT	STANDARD DEVIATION	SUM OF ARGUMENTS		NON-WEIGHTED		
150	241.833	57.500	36275.000				

FIGURE 23--Continued

UPPER LIMIT	OBSERVED FREQUENCY	PER CENT OF TOTAL	CUMULATIVE PERCENTAGE	CUMULATIVE REMINDER	MULTIPLE OF MEAN	DEVIATION FROM MEAN
20	1	.66	.6	99.3	.082	-3.857
40	7	4.66	5.3	94.6	.165	-3.510
60	0	.00	5.3	94.6	.248	-3.162
80	0	.00	5.3	94.6	.330	-2.814
100	0	.00	5.3	94.6	.413	-2.466
120	0	.00	5.3	94.6	.496	-2.118
140	0	.00	5.3	94.6	.578	-1.771
160	0	.00	5.3	94.6	.661	-1.423
180	6	3.99	9.3	90.6	.744	-1.075
200	9	5.99	15.3	84.6	.827	-.727
220	4	2.66	17.9	82.0	.909	-.379
240	17	11.33	29.3	70.6	.992	-.031
260	28	18.66	47.9	52.0	1.075	.315
280	66	43.99	91.9	8.0	1.157	.663
300	12	7.99	100.0	.0	1.240	1.011

jury pool had 120 jurors in it. Next, the simulation was rerun with 110 jurors in the jury pool. Next the simulation was run with 100 jurors in the jury pool. This pattern was continued until the number of jurors in the jury pool was reduced to a minimum of thirty. The minimum of thirty was required in order to allow one voir dire to take place. With any less than thirty jurors in the jury pool, it would be impossible for any voir dieres to take place. Figure 24 is a plot of the number of jurors in the jury pool versus the duration of the five dockets of fifty cases each.

In the actual simulation, the average utilization of the jurors in the jury pool varied with the number of jurors that were present in the jury pool. As the number of jurors in the jury pool was reduced, the average utilization tended to increase. Figure 25 is a plot of this relationship. However, as the size of the jury pool was reduced below sixty, average juror utilization tended to decrease somewhat. The total duration of the five dockets increased dramatically as the number of jurors in the jury pool was reduced below sixty. A summary of the actual duration and utilization figures for each of the court dockets simulated is contained in Appendix C.

#### Simulation Results -- Multiple Voir Dire Approach

The model of the court system using the multiple voir dire approach was run for a total of five simulated dockets of the court system. That is, five dockets, each of which had fifty cases on them, were simulated. With a jury pool of 120, a total of 40,072 minutes of simulated time was required to hear the five dockets of cases (250 cases). The comparable time for the court using the "conventional" jury pool



FIGURE 24  
RESULTS OF SIMULATION WITH  
"CONVENTIONAL" JURY POOL

Duration vs. Size of Pool

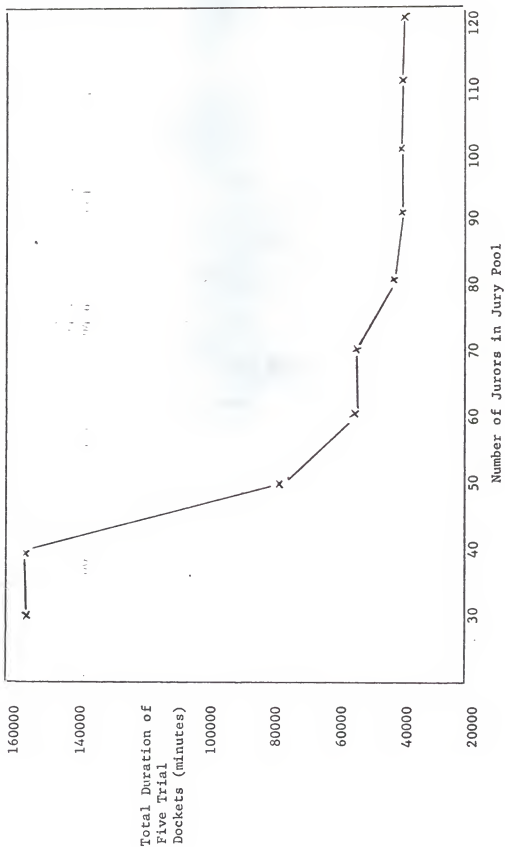
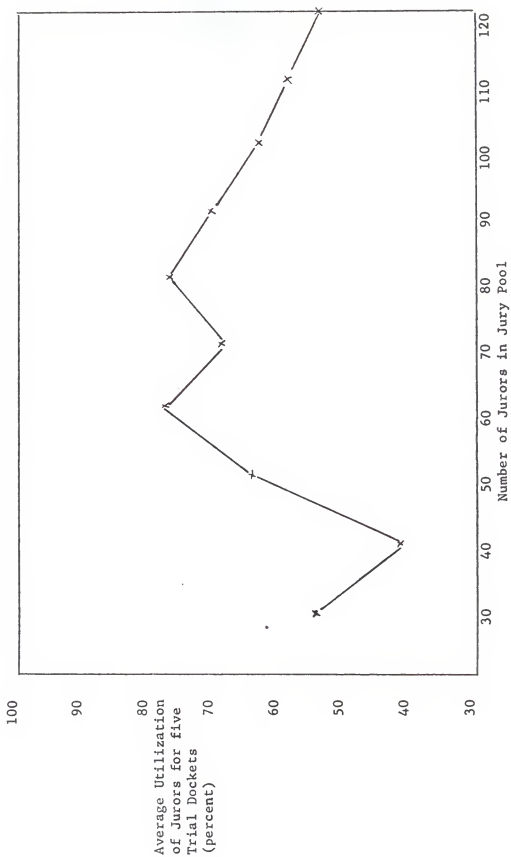


FIGURE 25  
RESULTS OF SIMULATION WITH  
"CONVENTIONAL" JURY POOL  
Utilization vs Size of Pool



approach was 40,308 minutes. This section is divided into two parts: (1) a description of the modifications made in the previously described model and (2) a discussion of the output of the simulation model.

### The Model With Multiple Voir Dires

The model developed in the previous section represents a court which uses a "conventional" jury pool arrangement. The modifications necessary in the model to simulate the multiple voir dire approach are described below.

The model which was developed can best be understood by examining the flowchart in Figure 26. The block types used in this GPSS/360 simulation are the same as those used in the previously developed model. The block symbols used are explained in Appendix B.

A listing of the GPSS program written to simulate a court using the multiple voir dire approach is shown in Figure 27. The listing also includes some sample output from the program.

The simulation that was developed was run first with 120 jurors in the jury pool. These jurors were generated at the start of the simulation. The "entities" generated then proceeded to "Storage #1" which represented the jury pool. These jurors remained in the pool until they were summoned for a voir dire. The 120 jurors that were generated were "created" at the same time and entered the jury pool at the beginning of the simulation.

A group of cases were generated at the same time as the jurors. Initially, fifty cases were generated for a docket. After these cases were generated, they were placed on the case docket. The case docket was represented by Queue #1. The cases that entered the docket were kept there until the operations blocks which represented the jury clerk

FIGURE 26  
SIMULATION FLOWCHART

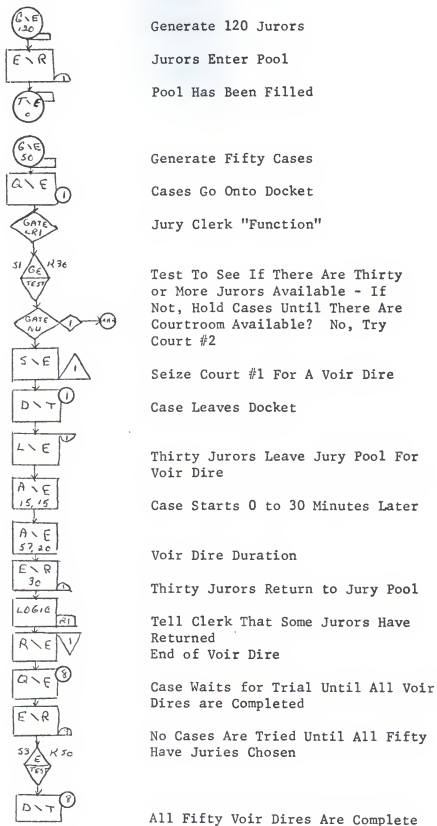


FIGURE 26 (Cont.)

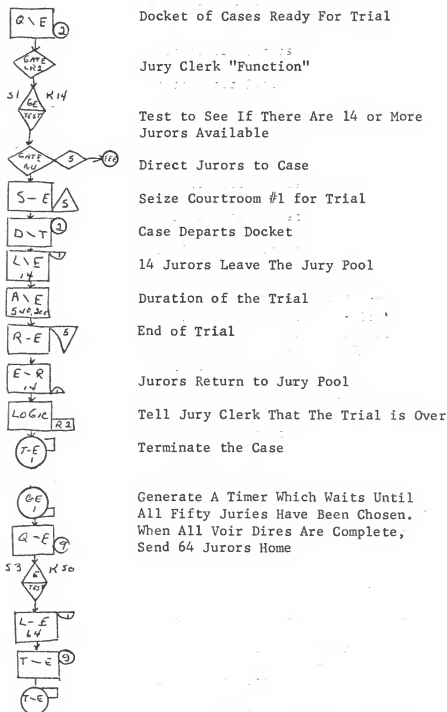


FIGURE 27  
PARTIAL LISTING OF THE GPSS PROGRAM--  
MULTIPLE VOIR DIRE APPROACH

BLOCK NUMBER	*LOC	OPERATION	A,B,C,D,E,F,G	COMMENTS	CARD NUMBER
	*	SIMULATE			1
	*				2
	*				3
	*				4
	*				5
	*				6
	*				7
	*				8
	*				9
	*				10
	*				11
	*				12
	*				13
	*				14
	*				15
	*				16
	*				17
	*				18
	*				19
	*				20
	*				21
	*				22
	*				23
	*				24
	*				25
	*				26
	*				27
1	ABC	GENERATE	ST1,20,20,7		
2	ENTER	1	120		
3	TERMINATE	0			
4		GENERATE	50		
5		QUEUS	1		
6	MM	GATE LR	1		
7		TEST GE	SL,K30		
8		GATE NU	1,AAA		
9		SEIZE	1		
10		DEPART	1		
11		LEAVE	1,30		
12		ADVANCE	15,15		

FIGURE 27--Continued

BLOCK NUMBER	*LOC	OPERATION	A, B, C, D, E, F, G	COMMENTS	CARD NUMBER
13		TABULATE	1		28
14		ADVANCE	57,20		29
15		ENTER	1,30		30
16		TABULATE	1		31
17		LOGIC R	1		32
18		RELEASE	1		33
19	*	TRANSFER	,JJJ		34
20	AAA	GATE NU	2,888		35
21		SEIZE	2		36
22		DEPART	1		37
23		LEAVE	1,30		38
24		ADVANCE	15,15		39
25		TABULATE	1		40
26		ADVANCE	57,20		41
27		ENTER	1,30		42
28		TABULATE	1		43
29		LOGIC R	1		44
30		RELEASE	2		45
31	*	TRANSFER	,JJJ		46
32	BBB	GATE NU	3,CCC		47
33		SEIZE	3		48
34		DEPART	1		49
35		LEAVE	1,30		50
36		ADVANCE	15,15		51
37		TABULATE	1		52
38		ADVANCE	57,20		53
39		ENTER	1,30		54
40		TABULATE	1		55
41		LOGIC R	1		56
42		RELEASE	3		57
43	*	TRANSFER	,JJJ		58
44	CCC	GATE NU	4,DDD		59
45		SEIZE	4		60
					61
					62
					63

FIGURE 27--Continued

BLOCK NUMBER	*LOC	OPERATION	A, B, C, D, E, F, G,	COMMENTS	CARD NUMBER
46		DEPART	1		64
47		LEAVE	1,30		65
48		ADVANCE	15, 15		66
49		TABULATE	1		67
50		ADVANCE	57,20		68
51		ENTER	1,30		69
52		TABULATE	1		70
53		LOGIC R	1		71
54		RELEASE	4		72
55	*	TRANSFER	,JJJ		73
56		LOGIC S	1		74
57	*	TRANSFER	,MMM		75
	*				76
	*				77
	*				78
					79
58	JJJ	QUEUE	8		80
59		ENTER	3		81
60		TEST E	S3,K50		82
61		DEPART	8		83
62		QUEUE	2		84
63	QQQ	GATE LR	2		85
	*				86
64		TEST G	S1,K14		87
65		GATE NU	5,FFF		88
66		SEIZE	5		89
67		DEPART	2		90
68		LEAVE	1,14		91
69		ADVANCE	540,200		92
70		RELEASE	5		93
71		ENTER	1,14		94
72		LOGIC R	2		95
73	*	TERMINATE	1		96
					97



FIGURE 27--Continued

BLOCK NUMBER	*LOC	OPERATION	A, B, C, D, E, F, G, 6, FFF	COMMENTS	CARD NUMBER
74	EEE	GATE NU	6		98
75		SEIZE	2		99
76		DEPART	1, 14		100
77		LEAVE	540, 200		101
78		ADVANCE	6		102
79		RELEASE	1, 14		103
80		ENTER	2		104
81		LOGIC R	1		105
82	*	TERMINATE	7, GGG		106
83		GATE NU	7		107
84		SEIZE	2		108
85		DEPART	1, 14		109
86		LEAVE	540, 200		110
87		ADVANCE	7		111
88		RELEASE	1, 14		112
89		ENTER	2		113
90		LOGIC R	1		114
91	*	TERMINATE	8, HHH		115
92	GGG	GATE NU	8		116
93		SEIZE	2		117
94		DEPART	1, 14		118
95		LEAVE	540, 200		119
96		ADVANCE	8		120
97		RELEASE	1, 14		121
98		ENTER	2		122
99		LOGIC R	1		123
100	*	TERMINATE	2		124
101	HHH	LOGIC	2		125
102		TRANSFER	, QQ		126
103	*	GENERATE	, , 1		127
					128
					129
					130
					131

FIGURE 27--Continued

BLOCK NUMBER	*LOC	OPERATION	A,B,C,D,E,F,G,	COMMENTS	CARD NUMBER
104		QUEUE	9		132
105		TEST E	S3,K50		133
106	LEV	LEAVE	1,64		134
107		DEPART	9		135
108		TERMINATE	0		136
	1	STORAGE	120		137
	3	STORAGE	200		138
	*				139
		START	50		140
		CLEAR			141
		START	50		142
		CLEAR			143
		START	50		144
		CLEAR			145
		START	50		146
		CLEAR			147
		START	50		148
		CLEAR			149
1	ABC GENERATE	***,110			150
MULTIPLE DEFINITION OF SYMBOL IN ABOVE CARD					
	1	STORAGE	110		151
106	LEV	LEAVE	1,54		152
MULTIPLE DEFINITION OF SYMBOL IN ABOVE CARD					
		START	50		153
		CLEAR			154
		START	50		155
		CLEAR			156
		START	50		157
		CLEAR			158
		START	50		159
		CLEAR			160
		END			161

FIGURE 27--Continued

8125

FIGURE 27--Continued

BLOCK CURRENT	TOTAL	BLOCK CURRENT	TOTAL	BLOCK CURRENT	TOTAL	BLOCK CURRENT	TOTAL	BLOCK CURRENT	TOTAL	BLOCK CURRENT	TOTAL	BLOCK CURRENT	TOTAL
101	0	0											
102	0	0											
103	0	1											
104	0	1											
105	0	1											
106	0	1											
107	0	1											
108	0	1											
FACILITY	AVERAGE UTILIZATION	NUMBER ENTRIES	AVERAGE TIME/TRAN	SEIZING TRANS. NO.	PREEMPTING TRANS. NO.								
1	.119	13	74.441										
2	.110	13	68.923										
3	.106	11	78.909										
4	.110	13	68.923										
5	.880	13	550.461										
6	.872	13	545.615										
7	.820	12	555.333										
8	.840	12	569.333										
STORAGE	CAPACITY	AVERAGE CONTENTS	UTILIZATION	ENTRIES	AVERAGE TIME/TRAN	CURRENT CONTENTS	MAXIMUM CONTENTS						
1	120	2.415	.020	2320	8.459	56	120						
3	200	46.744	.233	50	7595.937	50	50						
QUEUE	MAXIMUM CONTENTS	AVERAGE CONTENTS	TOTAL ENTRIES	ZERO ENTRIES	PERCENT ZEROS	AVERAGE TIME/TRANS	SAVERAGE TIME/TRANS	TABLE NUMBER	CURRENT CONTENTS				
1	49	2.803	50	1	1.9	455.500	464.795						
2	46	19.950	50	4	7.9	3241.939	3523.847						
8	50	2.707	50	1	1.9	439.939	448.918						
9	1	.119	1	.0	.0	968.000	968.000						
\$ AVERAGE TIME/TRANS = AVERAGE TIME/TRANS EXCLUDING ZERO ENTRIES													



determined that the conditions were right for sending a number of jurors to a courtroom. The function which the jury clerk provides was simulated by the use of a "gate" block in combination with a "test" block. (Blocks 6 and 7). The gate was closed when a particular logical condition existed in the simulation. Initially, at the start of the simulation, the logical condition was such that the gate was open. The "gate" block served to keep the jurors in the jury pool and the cases on the docket until they could be tried. The logical condition which determined whether cases could leave the docket and whether jurors could leave the jury pool was determined by the logical condition of Logic Switch #1. The purpose of the logic switch was similar to its use in the original model.

Jurors were allowed to leave the jury pool and cases were tried only after there were at least thirty jurors available to hear the voir dire. Hence, the simulation model next tested for the availability of at least thirty jurors in the jury pool. This panel size was the same as that used in the original simulation.

In the simulation model, the test of the availability of thirty jurors in the jury pool was performed by a "test" block (Block 7). This test block compared the number of entities (jurors) in Storage #1 to the fixed panel size (30). Similarly, in the simulation model, if there was a voir dire taking place in one of the courtrooms, the availability of the other courts was checked in turn. Specifically, if there was a voir dire taking place in courtroom #1, the jury clerk checked to see if court #2 was available. If courtroom #2 was occupied, the jury clerk checked to see whether either of the other courts were available in turn. If courtroom #4 was not available, and each of the

other courts was occupied, no cases were taken off the docket. Additionally no jurors were summoned from the jury pool. The simulation model checked to see if there was a voir dire taking place in a particular court. If there was no voir dire taking place in the court, the jury clerk took a case off the docket and seized a courtroom for the case. In the simulation model, the courtroom was represented by a "facility." In the simulation model the case seizes a facility for a voir dire and then removes a case from the docket (Queue 1). The case was taken off the docket by use of a "depart" block. Each of the blocks described up to this point does not cause the simulator's clock to move. That is, as far as the simulation is concerned, passage of the entities from block to block does not require time. In order to simulate the passage of time the "advance" block is used.

In the model used to simulate the multiple voir dire approach, a random period of time lapsed between the availability of a courtroom and the start of a voir dire. The amount of delay was a random variable and this delay was the same as that experienced in the original simulation model. This means that the voir dire started between zero and thirty minutes after a courtroom became available. A panel of jurors was sent to the courtroom for a voir dire as soon as the voir dire was ready to start. The thirty jurors necessary for the voir dire were removed from the jury pool (Storage #1) by the use of a "leave" block. The B operand of this "leave" block was thirty. This caused thirty jurors to be removed from the jury pool (Storage #1).

The duration of the voir dire was simulated by the use of an "advance" block. The model used to simulate the multiple voir dire approach used an average duration of 57 minutes for the voir dire. This duration was the same as that simulated in the original model.

After the voir dire was completed, all of the jurors were returned to the jury pool. This was contrasted to the situation in the original model with the "conventional" jury pool. In the original model, only the "strikes" were returned to the jury pool. However, with the multiple voir dire approach, all thirty jurors were available to be chosen for another case. In the simulation model of the court with the multiple voir dire approach, these jurors were returned to the jury pool by the use of the "enter" block (Blocks 15, 27, 39 and 50). As the jurors were returned to the jury pool, the status of Logic Switch #1 was reset (Blocks 17, 29, 41 and 53). The significance of this change in status came from the increase in the number of jurors in the jury pool. If for some reason, there were an insufficient number of jurors in the jury pool, or all of the courts were occupied with voir dire, logic switch #1 would be in a "set" condition. The return of thirty jurors to the jury pool signified the completion of a voir dire and the availability of previously unavailable jurors for usage.

After the voir dire was completed, the case was transferred to Queue #8. The purpose of this Queue was to hold cases until they could be tried. In this model, the case actually left the voir dire facility and entered a Queue. Additionally, it passed through an "enter" block. This caused the content of Storage #3, which had just been "entered" to be incremented by one. The test block which followed Queue #1 tested to find out if there were fifty cases in this storage (Block 60). Hence, cases were held at Queue #8 until a total of fifty cases had entered the storage.

After the case had been transferred from the courtroom to Queue #8, the "jury clerk" checked for the availability of thirty jurors to start the next voir dire. If there were thirty jurors available,



the next voir dire was started. The procedure which then followed was the same as that previously outlined. After all fifty cases had been transferred into Queue #8, the actual trial phase started. The transfer of the fiftieth case into Queue #8 signified that all fifty voir dire had been completed. At this point, it was unnecessary to call more than twelve jurors plus two alternates for a particular case. That is, with a maximum of four courts operating at the same time, no more than 56 jurors were required for the court to operate. In reality, it is possible that jurors may inadvertently be called on the wrong day. Additionally, some cases may terminate sometime during the voir dire or shortly after the voir dire. These terminations sometimes occur immediately following the selection of the jury.

In the model which was simulated, such early and unexpected terminations were not simulated. However, such terminations could be simulated by using a "transfer" block. The "transfer" block would randomly select some proportion of the cases and cause these cases to be terminated early.

After the actual trial was started, its duration was simulated by the use of an "advance" block. The duration of the trial was simulated as a random variable with a mean of 540 minutes. This duration for the trial was the same as that simulated in the original model.

After the trial was completed, the courtroom facility was returned to "available" status. The entity (case) released the facility by the use of a "release" block. (Blocks 70, 79, 88 and 97). At the end of the trial, the jurors were returned to the jury pool. This was simulated by the use of an "enter" block. (Blocks 71, 80, 89 and 98) The enter block caused fourteen jurors to return to the jury pool.

(Storage #1). Additionally, the simulation model caused the condition of Logic Switch #1 to be reset.

At the start of the trial portion of the courtroom activity, all those jurors who were not needed were sent home. Since only 48 jurors plus eight alternates were required to try four cases simultaneously 64 jurors were sent home. The 64 jurors were sent home by the use of a "leave" block. (Block 106). The 64 jurors were removed as soon as the fifty voir dire were completed.

### Simulation Results

The simulation was run first with 120 jurors in the jury pool. In order to test the effect of reducing the number of jurors upon the total time required to hear the cases, the size of the jury pool was reduced. This was done by decreasing the number of jurors that were initially introduced into the jury pool. An additional modification in the model was necessary to reduce the size of the jury pool. When the number of jurors initially placed in the jury pool was reduced, the number of jurors to be sent home after the voir dire are completed was reduced. That is, if the jury pool contained one hundred jurors at the start of the voir dire, only 44 jurors could be sent home at the end of the voir dire (since 56 were still required to try four cases simultaneously).

The initial decreases in the size of the jury pool had very little effect on the total duration of the five dockets of fifty cases. However, as the number of jurors in the jury pool was reduced, the duration of the five dockets eventually increased.

Each reduction in the number of jurors in the jury pool caused a decrease in the total fee paid to jurors. The number of jurors in

the jury pool was reduced in increments of ten. That is, initially the jury pool had 120 jurors in it. After all of the voir dres were completed, 64 jurors were sent home. Next, the simulation was rerun with 110 jurors in the jury pool. After the voir dres were completed, 54 jurors were sent home. This pattern was continued until a number of jurors in the jury pool was reduced to a minimum of thirty. A minimum of thirty was required in order to allow one voir dre to take place. With any less than thirty jurors in the jury pool, it would be impossible for any voir dre to take place. With thirty jurors in the jury pool, a maximum of one voir dre could take place or a maximum of two cases could take place simultaneously.

A simulation of five court dockets of fifty cases each was performed for each of the jury pools listed. That is, five dockets of fifty cases were simulated using 120 jurors in the jury pool for the voir dre and 56 jurors in the jury pool for the trying of the cases. Next, five dockets of fifty cases were simulated using a jury pool of 110 for the voir dres and 56 jurors for the trying of the cases. The number of jurors in the jury pool for the voir dres was decreased in increments of ten down to a minimum of thirty jurors. Figure 28 is a plot of the number of jurors in the jury pool for the voir dre versus the duration of the five dockets of fifty cases each. Figure 29 is a plot of the number of jurors in the jury pool for the voir dre versus the average utilization of the jurors. The average utilization of the jurors in the jury pool varied with the number of jurors that were present. The average utilization of jurors in the model simulating the court using the multiple voir dre approach was the indirect result of several statistics accumulated during the simulation. The calculations necessary to arrive at the average utilization are explained in Appendix C.

FIGURE 28  
RESULTS OF SIMULATION WITH MULTIPLE  
VOIR DIRE APPROACH

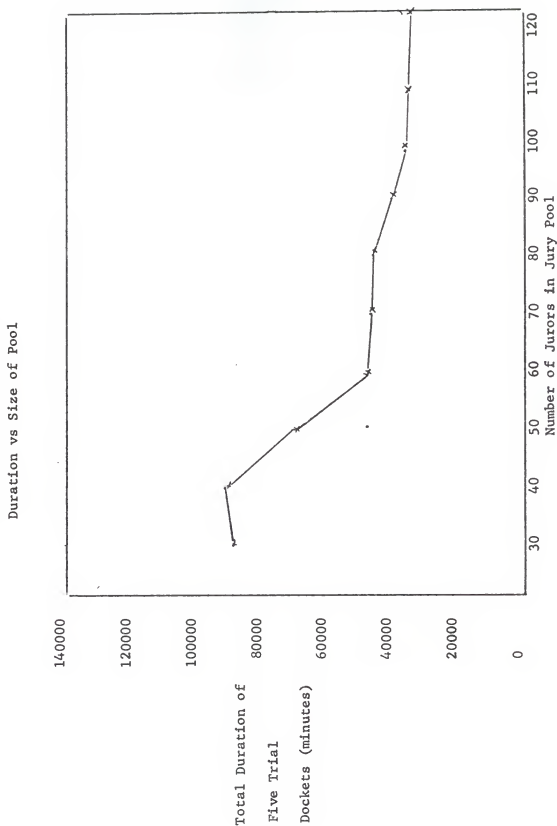
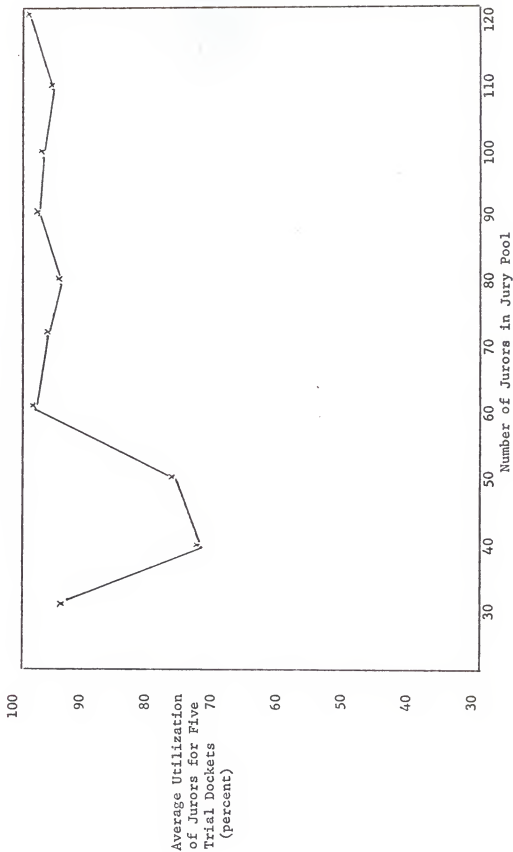


FIGURE 29  
RESULTS OF SIMULATION WITH MULTIPLE  
VOIR DIRE APPROACH

Utilization vs Size of Pool



As the number of jurors in the jury pool was reduced, the average utilization did not change much. However, when the size of the jury pool was reduced from sixty jurors to fifty jurors and then to forty jurors, the average utilization decreased. This decrease could be explained by the odd number of jurors in the jury pool during the voir dire portion of the trial. When there were fifty jurors in the jury pool, a maximum of thirty jurors could be used at one time. The additional twenty jurors could not be used because thirty jurors were required to start a second voir dire.

A summary of the duration and average utilization of each of the dockets is contained in Appendix C.

#### Analysis of Observed Differences

Comparisons of the effectiveness of the "conventional" jury pool approach and the multiple voir dire approach can be made on the basis of: (1) the duration of a docket of cases tried using both systems and (2) the utilization of jurors in the jury pool using each of the Juror Management Systems. The analysis of the differences observed is divided into these two categories.

#### Duration of a Docket

The simulated court using the "conventional" jury pool approach produced a relatively constant overall duration for five trial dockets despite reduction in the size of the jury pool. However, as the jury pool was decreased from ninety to eighty jurors, the observed duration increased. The increase was even more dramatic as the size of the jury pool was reduced more. Similar effects were observed in the case of the simulated court using the multiple voir dire approach. However, a

comparison of the duration of the trial dockets as the size of the jury pool was reduced more. Similar effects were observed in the case of the simulated court using the multiple voir dire approach. However, a comparison of the duration of the trial dockets as the size of the jury pool is reduced is useful. Using the "conventional" jury pool approach, the total duration of the five dockets increased from 40,308 minutes using a jury pool of 120 to 154,001 minutes using a jury pool of thirty. Using the multiple voir dire approach, the simulated duration of the five trial dockets was 40,072 minutes using a jury pool of 120. This increased to a total duration of 88,155 minutes using a jury pool of thirty. This comparison is illustrated in Figure 30.

#### Utilization of Jurors in the Jury Pool

Comparisons of the utilization of jurors under the two juror management approaches is much more dramatic. The utilization of jurors was significantly higher using the multiple voir dire approach, regardless of the number of jurors in the jury pool. This relationship is illustrated in Figure 31. The actual utilization figures observed are not directly comparable to any published statistics on juror utilization. The utilization figures accumulated using the GPSS model took into account whether the juror was being used during each minute of the simulated court time. Neither the Juror Usage Index nor the percentage of unused jurors are directly comparable to the utilization figures accumulated during the simulation.

The simulation models constructed indicate dramatically higher utilization of jurors using the multiple voir dire approach to juror management. Additionally, this approach provided a better utilization of the court facilities (judge, courtroom, clerks, recorders, etc.).

FIGURE 30  
RESULTS OF SIMULATION--  
COMPARISON OF JUROR MANAGEMENT APPROACHES

Duration vs Size of Pool

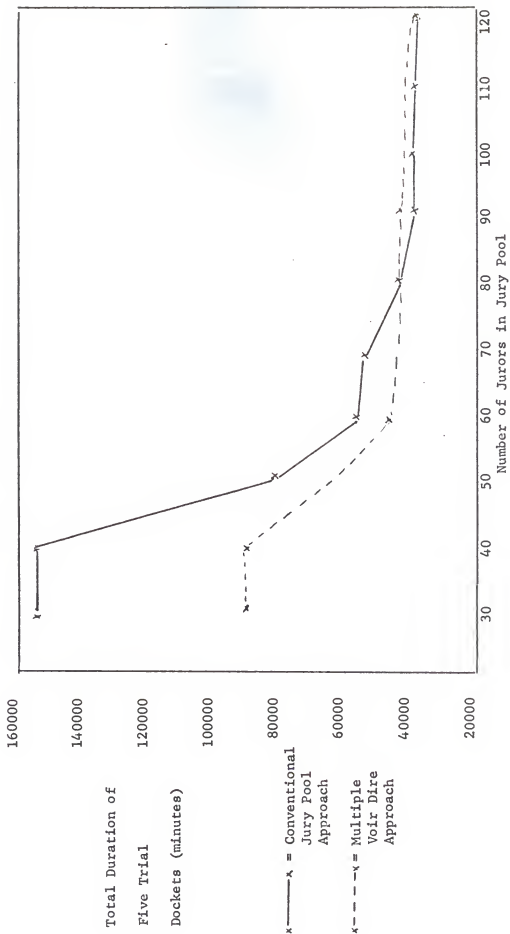
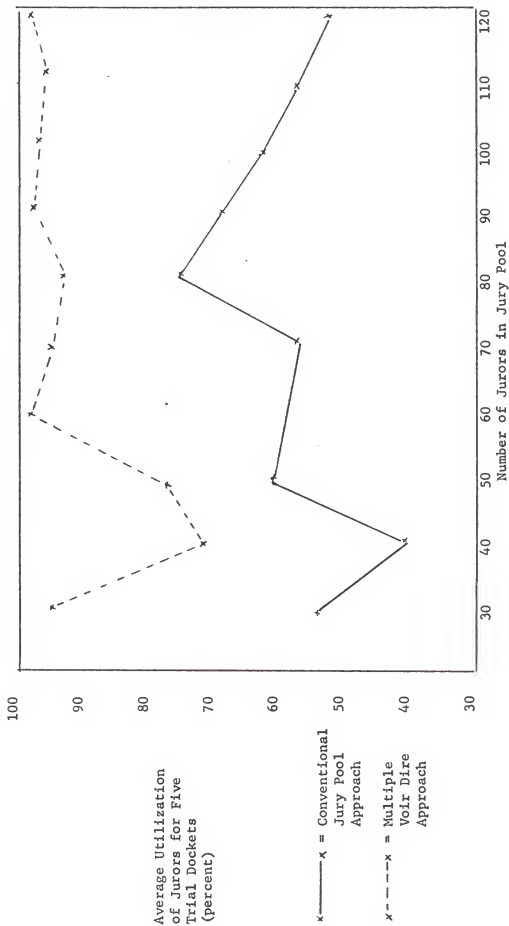




FIGURE 31  
RESULTS OF SIMULATION--  
COMPARISON OF JUROR MANAGEMENT APPROACHES

Utilization vs Size of Pool



The superiority of the multiple voir dire approach over the "conventional" jury pool approach was demonstrated using the simulation model.

### Restriction

In the model of the court using the "conventional" jury pool approach and in the model of the court using the "multiple voir dire" approach, no restriction was placed on the number of times a juror could be used for either a voir dire or a trial. Such a restriction might, however, be desirable. Some federal courts do allow jurors to serve on more than one case. It can be argued, however, that a juror may develop a more callous attitude as a result of participating in a number of cases.

In a case of a court using the "multiple voir dire" approach, if a juror is selected for more than one case, the possibility exists that the juror could be needed to participate in more than one case at the same time. This potential problem could be managed by careful scheduling of cases. This problem could be handled alternatively by restricting a juror's term of service to one case per trial docket. This restriction would also minimize the probability that a juror could develop a callous attitude toward any of the parties involved in a case.

## CHAPTER VI

### FULL DEVELOPMENT OF THE MODEL

The model developed in Chapter V is an abstraction of the real world. It is the result of the specific data gathered during this study. The research done suggests a course for further research. In particular, more research into the problem of forecasting the demand for jurors is indicated.

This chapter is divided into three parts. First, those factors which should be further investigated are determined. Second, the sources of the necessary data are identified. Third, the probable form of the forecasting model to be formulated by the study is suggested.

#### Factors Which Affect the Demand for Jurors

Some of the factors which may affect the demand for jurors have been suggested in the literature. Other possible factors were identified as a result of responses to the open-ended questionnaire sent to each of the 93 districts and through a personal interview with Judge Ben Krentzman of the Middle District of Florida and a phone interview with Judge Noel Fox of the Western District of Michigan.

The demand for jurors is influenced in three ways. First, certain factors may affect the number of peremptory challenges and challenges for cause. These factors may, therefore, influence the desirable size of the voir dire panel. These same factors may also affect the size of the jury (including alternates) which actually tries

the case. Second, certain factors affect the number of panels required. These factors include the number of postponements, waivers of juries, and settlement and guilty pleas. Third, the demand for jurors is influenced by the relative timing of requests for juries. The characteristics of this pattern influence the number of jurors who must be available "just in case they are needed." These three factors are considered separately.

#### Factors Which Affect the Size of the Panels

It is a widely held belief that the demand for jurors is affected by whether the case is widely publicized. It is suggested that cases which are more widely publicized will require a larger number of jurors for the voir dire panel. The reasoning lies in the fact that a juror may be challenged for cause, if in fact, he has knowledge of the facts of the case. As the degree of publicity of a case increases, it becomes more likely that the potential juror will have knowledge of the case and could be prejudiced regarding its outcome. Since the number of challenges for cause is theoretically unlimited, the necessary size of the voir dire panel is theoretically unlimited. The relationship between the degree of publicity and the demand for jurors has not been investigated empirically.

It has also been suggested that the defendant's prior conviction record may be a significant factor affecting the number of jurors required for the voir dire panel. The reasoning behind this particular suggestion is more obscure. The facts concerning a defendant's prior conviction record are not made known to the judge until sentencing (in the case of a criminal trial). However, some lawyers believe that jurors may be prejudiced by a defendant's previous criminal record.

Peremptory challenges may be exercised without any stated reason on the part of counsel. Therefore, some lawyers may challenge potential jurors due to this possible "prejudice." In other situations, with a different defendant, they might not exercise the right to challenge. The effect of this action would be to tend to increase the need for jurors on a voir dire panel if the defendant has a prior conviction.

It has also been suggested that the judge hearing the case may affect the demand for jurors. That is, the number of jurors required on the voir dire panel may vary with different judges. The reasoning behind this suggestion is as follows. The procedure in some courts is to start with a panel of 28 for the voir dire, have counsel exercise its challenges for cause, replacing each challenged juror as he (she) is challenged, and then the judge instructs counsel to exercise the maximum number of peremptory challenges. This brings the panel to the necessary size for the trial. In other courts, peremptory challenges are not mandatory. Counsel may find that the judge allows challenges relatively freely. Consequently, there may be little reason to exercise the peremptory challenges. This could have the effect of changing the demand for jurors on the panel.

Probably the most significant of those factors affecting the demand for jurors is the type of case involved. The type of case involved may be defined as criminal or civil. Additionally, these two categories could be broken down considerably further according to the specific law(s) involved. The demand for jurors may be related to the type of case involved for different reasons. First, the type of trial involved may affect the probable duration of the trial. As the expected trial duration increases, the number of alternates necessary will probably

increase. Practically, the number of alternates cannot be less than zero and the number seldom exceeds three. The jury which will try the case represents a second source of demand for jurors. Many of the United States District Courts have adopted rules which allow a civil case to be tried with a six man jury. However, all criminal cases in the Federal District Courts require twelve man juries. Consequently, the civil versus criminal nature of the case involved affects the demand for jurors. The third factor which is related to the type of case is the number of jurors likely to be challenged. The reasoning behind this suggestion is similar to a situation discussed previously. Certain jurors may react differently to different types of cases and the lawyers involved in a case may recognize this. For example, in the Merrill and Schrage study, it was found that former insurance company employees were more likely to be challenged for cause in civil cases than other potential jurors.<sup>1</sup> It is plausible to expect that the same type of phenomenon could be true in the case of other "types" of potential jurors. This phenomenon is also not necessarily limited to civil cases. For example, it has been suggested that certain individuals react in a prejudiced manner to defendants in certain types of cases. If this is true, the argument can be made that the number of challenges exercised in the voir dire may be somewhat dependent upon the type of case.

The background of potential jurors may affect the demand for jurors. That is, certain types of jurors may be challenge-prone.<sup>2</sup> If in fact, a panel contained a high proportion of challenge-prone

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<sup>1</sup>Merrill and Schrage, p. 63.

<sup>2</sup>Pabst, p. 76.

individuals, the number of challenges exercised will be larger than normal. This would then affect the overall demand for jurors.

#### Factors Which Affect the Number of Panels Requested

The number of panels requested by the judge in a court is influenced by the number of postponements, the number of waivers of juries, and the settlement or guilty pleas. These factors may possibly be predicted on the basis of whether the case is widely publicized, whether the defendant has a prior conviction, the type of case involved, and the judge and counsel trying the case.

Little, if any, of an empirical nature has been done in an attempt to measure the relationship which may or may not exist between these two sets of variables. The usefulness of such a study would come from the concept that such things as the case type, the defendant's prior conviction record, whether the case is widely publicized, and the judge hearing the case would all be leading-type variables. Therefore, it might be possible to improve the estimate of the number of panels to be requested by the court in addition to the number of jurors required for the voir dire panel and for the trial.

#### The Pattern of Demand for Jurors Throughout Time

The number of voir dres and/or trials taking place at the same time in part determine how many jurors must be summoned. If all judges in a particular district conducted voir dres at the same time, the peak demand for jurors could conceivably be very large. It is unlikely, however, that voir dres will take place in all of the courts at the same time.

The duration of the voir dire also influences the pattern of demand throughout time. If a voir dire is relatively long compared with the duration of the actual trial, this increases the probability that more than one voir dire will take place simultaneously.

Several suggestions have been made to reduce the large peak number of jurors needed for simultaneous voir dire. It has been proposed that if starting times for jury trials were precisely scheduled, the peak demand for jurors could be reduced significantly. However, in a study of the United States District Court for the Southern District of New York, William A. Stoevers concluded that an administrative system involving precise scheduling of starting times of jury trials was not feasible. Stoevers reached this conclusion "because of many factors which cause starting times to vary widely." He concluded that "a court cannot be run as efficiently as a business because of the need to reserve procedural rights and safeguards. For this reason, proposals for a precise schedule of staggered starting times for trials are unrealistic within the present operation of the court."<sup>3</sup>

#### Sources of Necessary Data

The data necessary to perform these analyses of the relationships postulated in the previous section are not readily available. Further development of the model could have as its primary objective the empirical investigation of the influence on the probable number of jurors required of such factors as: case type, the judge hearing the case, whether the case is widely publicized, or whether the defendant had a prior conviction. Estimates of the probable number of jurors

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<sup>3</sup>Stoevers, pp. 1-2.



necessary would include estimates of the number of alternate jurors, the number of regular jurors, and the number of challenges that would be exercised during the voir dire. The second primary objective would be to investigate empirically the influence of these same factors on the probability of postponement, probability of waiver of jury, and probability of settlement or guilty plea.

The effectiveness of a system designed to forecast the demand for jurors would depend upon the accuracy of the estimates made.

The data which are necessary for the investigation of the relationship are, in most cases, available only by direct observation of the court involved. The data necessary for these analyses are not commonly maintained by the court. Some of the data are available by individual analysis of the case records which accompany a particular case. A good deal of the information is not maintained. The data that are maintained are available only at the source level. Summaries which would be necessary for the investigation of these relationship are not maintained.

In order to obtain all of the data necessary for such an investigation data would have to be accumulated at the time the cases are being heard. Such data could be collected over a period of time by a research assistant (or assistants) stationed in a particular court. It is unlikely that the jury clerk would have time to accumulate this data in most courts.

The duration of the data gathering phase would depend upon such factors as the size of the court, its case load, the type of cases which the court tried, and other factors. The duration of the data gathering phase would quite likely be in excess of one year.<sup>4</sup>

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<sup>4</sup>If the data gathering phase were less than one year in duration, the researcher could not be sure that he had observed any seasonal trend which might be present in the court.

### Probable Form of the Forecasting Model

The objective of research aimed at improvement of the forecasting model would be to determine the relationships which govern the demand for jurors. The relationships which would be investigated would most likely be probabilistic in nature. These relationships when identified could be incorporated into the simulation model which was the subject of Chapter IV.

The changes in the previously developed model would occur in changes in the nature of the cases, the jurors, and the judges. In the model developed in Chapter IV, each of the cases, jurors, and judges had basically the same characteristics. The objective of changes in the previously developed model would be aimed at making the characteristics of the cases, jurors, and judges more representative of their real life counterparts. In the simulation model that was developed in Chapter V, both cases and jurors were represented by "entities." The court (judge) was represented as a facility in the simulation model. The changes necessary in these entities and facilities for further development of the model are considered in turn.

### Changes in the Nature of Cases

In the model developed in Chapter V, each case was represented as an entity. A docket full of cases was created at the beginning of the simulation run. In the model which was constructed, each of these entities had identical characteristics. The simulation model could be modified in such a way that cases (represented by entities) having different "parameters" would be created at the beginning of the simulation. The "type" of case could be represented by a particular "parameter" of the "entity." Another "parameter" of the case could represent whether

the case was widely publicized. Assignment of values to each particular "parameter" could be made in some predetermined manner which was representative of the real-life system being modeled. Another parameter of the case could represent the prior arrest record of the defendant (if the case were a criminal one). Assignment of this parameter to the various cases could be made in a predetermined manner which was representative of the real-life system being modeled.

#### Changes in the Nature of Jurors

Similarly, in the previously developed model, each juror was represented as an entity. At the beginning of the simulation, the jury pool was filled by creating jurors and moving them into a "storage" which represented the jury pool. In the model which was constructed, each of these entities had identical characteristics. The simulation model could be modified in such a way that jurors (represented by entities) having different "parameters" could be created at the beginning of the simulation. These parameters could represent certain characteristics of the juror. For example, one parameter might represent the propensity of the juror to be challenged in a particular type of case. Other parameters of the juror (entity) could represent the propensity of the juror to be challenged in other types of cases. Assignment of values to each particular "parameter" could be made in some predetermined manner which would be representative of the real-life system being modeled.

#### Changes in the Nature of Judges

The last change in the previously developed model could be made in the facilities which represented the different judges. Judges have

differing characteristics which affect the demand for jurors in cases. For example, some judges require that the maximum number of peremptory challenges be exercised in every case before the court. Such a factor has an effect upon the demand for jurors of a particular court. Equally important, the type of case facing the court may influence the number of jurors requested. The simulation model could be designed in such a way that the nature of the case being tried was determined at the court (facility). Depending upon the nature of the case the model could be constructed to request differing numbers of jurors from the jury pool (storage) depending on the nature of the case and the characteristics of the judge hearing the case.

#### Usefulness of the Forecasting Model

The effects of particular combinations of judge, case, and jurors could be observed with this more complex model. The effectiveness of various forecasting approaches could be tested using the model.

Further research should include study of those observable characteristics which allow the court to predict more accurately the actual demand for jurors. It is unlikely that each of the factors mentioned which related to the jurors, the case, and the judge will have a significant impact on the demand for jurors. However, the effectiveness of a forecasting system based upon the findings of this study could be tested in the more fully developed simulation model. The effects of a court using a forecasting approach based upon the findings could be compared to the results achieved by a court which does not use this approach.

## CHAPTER VII

### SUMMARY AND CONCLUSIONS

This study had as its major objective the examination of the applicability and effectiveness of changes in the juror management systems used in Federal District Courts. This examination was deemed desirable because of the disutility associated with a low degree of juror utilization.

While a literature search revealed the existance of a few descriptive studies, there has been very little analytical research in this subject. The latter has been confined to (1) the effects on the juror's attitudes when he is not utilized<sup>1</sup> and (2) an attempt to forecast the peak requirement for jurors.<sup>2</sup>

This dissertation asserted that the number of jurors summoned could be reduced and the court would still have enough jurors to hear its cases with few or no delays. This study suggests two specific ways that this can be accomplished. First, each court needs to gather the necessary data to forecast its demand for jurors. The number of jurors it summons can then be matched to the requirements. Second, a change from the jury pool method to an alternative method could both increase the utilization of jurors and decrease the demand for jurors. Specifically, the multiple voir dire approach was found to be particularly effective in accomplishing these goals.

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<sup>1</sup>Merrill and Schrage, op. cit., pp. 37-38.

<sup>2</sup>Pabst, op. cit., p. 62.

This investigation concerned itself with the analysis of the relationship between certain observable factors in the court system and the court's juror utilization. The second primary objective was to build a simulation model which could be used to observe the effects of proposed changes in the jury management system.

The accomplishment of the two major objectives necessitated division of this study into two sections. One section concerned itself with the different variables which affected the effectiveness of the court's jury management approach and forecasting method. The other section concerned itself with the construction and application of the simulation model.

#### Scope

The dependent variables used were the Juror Utilization Index and the percentage of unused jurors. The independent variables used were those selected from the Court Management Statistics and those gathered by questionnaire.

#### Limitations

The scope and methodology of the study limited the findings because (1) the study was basically a cross-sectional analysis through a relatively short period of time; (2) two proxy-variables (Juror Usage Index and the percentage of unused jurors) were used as measures of juror utilization; and (3) no analysis was made of the factors which affect the demand for jurors. While possible sources of these data have been identified, the actual data have not been collected. To collect these would require a relatively long period of time and much research support.

### Summary of Findings

The conclusions drawn from this study follow.

#### Test of Hypothesis (1)

Hypothesis (1) was tested through the use of correlation analysis. The conclusion that there is no relationship between juror utilization and the rate of trial production indicated that increased juror utilization may be achieved without significantly affecting the rate of trial production.

The rejection of Hypothesis (1) resulted in the conclusion that juror utilization could be improved without significantly affecting the ability of the court to hear cases. This is significant because it contradicts a widely held belief that juror utilization can be achieved only at the expense of trial production.

#### Test of Hypothesis (2)

Hypothesis (2) was tested in the case of one particularly large district in the Federal Court System. In this district, the number of unused jurors was found to be considerably greater than zero in virtually all cases.

Analysis of the Z scores associated with the number of unused jurors showed that it was possible to reduce significantly the number of jurors called and still have enough jurors available to try each of the cases before the court without delay.

The rejection of Hypothesis (2) resulted in the conclusion that the forecasting approach used in some Federal District Courts is not adequate. In the case of the Southern District of New York, the court consistently calls more jurors than it utilizes.

### Test of Hypothesis (3)

Hypothesis (3) was tested by constructing a model of a "typical" four judge district court. This simulation model utilized a jury pool. After the model was constructed and run, it was modified to test the effects of a change to a "multiple voir dire" approach. The result of this change was an increase in average juror utilization from 51.3 percent to 97.1 percent (using a jury "pool" of 120).

The rejection of Hypothesis (3) indicates that utilization of jurors could be improved by the use of a multiple voir dire approach to juror management. Additionally, the usefulness of a simulation model to test the effectiveness of proposed changes in a court system was demonstrated.

### Comparative Analysis

Significant information concerning improved juror utilization was found through the use of various comparative analysis techniques. A test of independence of principle of classification indicated that the multiple voir dire approach was a particularly effective means of improved juror management.

Similar tests were used to determine: (1) the disposition of unused jurors did not influence juror utilization, and (2) variability in the number of jurors summoned for a trial docket did not influence juror utilization.

This research therefore supports the major hypothesis that the number of jurors summoned could be reduced and the court would still have enough jurors present to hear the cases that are called.



APPENDIX A

## SYNOPSIS OF ARGUMENTS PRO AND CON

### THE JURY SYSTEM

The Dean of the Harvard Law School, in the course of his annual report for 1962-1963, made certain recommendations for improvement of the administration of justice, among them the elimination of the jury in civil cases. Dean Griswold argued:

The Jury trial at best is the apotheosis of the amateur. Why should anyone think twelve persons brought in from the streets, selected in various ways, for their lack of general ability should have any special capacity for deciding controversies between persons?<sup>1</sup>

Kalven and Zeisel summarized some of the serious disadvantages of the jury as follows:

...that the jury is expensive; that it contributes to delay in civil litigation; that jury service imposes an unfair tax in social cost on those forced to serve; and that, in general, exposure to jury duty disenchant the citizen and causes him to lose confidence in the administration of justice...<sup>2</sup>

In addition to these disadvantages, Kalven and Zeisel point out that those who criticize the jury complain that the jury will not follow the law either because it does not understand it or because it does not like it, and that thus only a very uneven and unequal administration of justice can result from a reliance upon the jury. Additionally, critics

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<sup>1</sup>Harry Kalven, Jr., and Hans Zeisel, The American Jury. (Boston: Little, Brown and Company, 1966), p. 5.

<sup>2</sup>Ibid., p. 8.

question the competence of the individual jurors when compared to that of a judge.<sup>3</sup>

Those who defend the jury system are equally emphatic. Lord Justice Devlin, an experienced and greatly admired English judge, said of the jury system:

The jury is a little parliament. The jury sense is the parliamentary sense. I cannot see the one dying and the other surviving. The first object of any tyrant in Whitehall would be to make parliament utterly subservient to its will; the next to overthrow or diminish trial by jury, for no tyrant could afford to leave a subject's freedom in the hands of twelve of his countrymen. So that trial by jury is more than an instrument of justice and more than one wheel of the Constitution: it is the lamp that shows that freedom lives.<sup>4</sup>

Some of the specific advantages pointed to on behalf of the jury as an institution are: (1) the jury provides an important civic experience for the citizen; (2) because of popular participation, the jury makes tolerable the stringency of certain decisions; (3) because of its transient personnel, the jury acts as sort of a lightning rod for animosity and suspicion which might otherwise center on the more prominent judge; and (4) the jury is a guarantor of integrity, since it is said to be more difficult to reach twelve men than one.<sup>5</sup>

The debate over juries is, in addition to a philosophical argument, in some respects an economic one. The different federal, state, and local courts have summoned local citizens to serve as jurors throughout the years. A system of payment for the services of those selected as

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<sup>3</sup>Ibid., pp. 8-9.

<sup>4</sup>Ibid., p. 6.

<sup>5</sup>Ibid., p. 7.

jurors has developed through the years. This pay was usually far less than that which could be received in alternate forms of employment. This compensation has been increased gradually. Currently, an individual summoned for jury duty in a federal court is paid at the rate of \$20 per day.<sup>6</sup> There is, in addition, compensation for traveling expenses in some cases.










The advantages of the jury system must be balanced against the various costs involved. These costs include the direct payment made to the jurors, the social cost to those forced to serve, and the disenchantment and loss of confidence in the administration of justice which may result from jury duty.




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<sup>6</sup> Jury Selection and Service Act of 1968, 82 Stat. 62 (1968).

## APPENDIX B

# GPSS/360 BLOCK SYMBOLS

Symbol	Block Name	Purpose
	Generate	To bring transactions into existence.
	Terminate	To destroy transactions.
	Queue	To cause the updating of the statistics being maintained for waiting lines.
	Depart	To cause the updating of the statistics being maintained for waiting lines.
	Enter	To change the recorded status of storages.
	Leave	To change the recorded status of storages.
	Seize	a) To change the recorded status of a facility. b) To cause certain statistics relative to facilities to be automatically maintained. c) To prevent transactions from engaging a facility which is not currently available.
	Release	a) To change the recorded status of a facility. b) To cause certain statistics relative to facilities to be automatically maintained. c) To prevent transactions from engaging a facility which is not currently available.
	Gate	To examine a logical attribute to determine whether it is currently true or false, using the result to control the movement of the transaction which initiated the test.

<u>Symbol</u>	<u>Block Name</u>	<u>Purpose</u>
	Test	To test a relation between two standard numerical attributes, then use the test result to control the movement of the transaction which initiated the test.
	Advance	To hold a transaction for one or more time units at a particular point in a model before permitting it to move to the next sequential block.
	Logic	To modify the setting of a logic switch each time a transaction moves through the block.

## APPENDIX C



Number of Jurors in Jury Pool		120	110	100	90	80	70	60	50	40	30
Duration of:	First Docket	8131	7749	8032	7969	8278	10373	10913	15266	31578	29955
	Second Docket	7863	7805	7731	7845	8167	10731	10825	15986	30913	31492
	Third Docket	8179	8037	8061	7876	8274	10885	10656	16024	30484	31687
	Fourth Docket	8148	7790	8407	8170	8588	10591	11198	15923	32386	31001
	Fifth Docket	7987	7980	8160	7826	8113	10153	10700	15164	30616	29866
	Total For Five Dockets	40808	39361	40391	39876	41420	52733	54292	78363	155977	154001
Utilization of Jury Pool For:	First Docket	.511	.569	.611	.686	.755	.665	.761	.631	.396	.536
	Second Docket	.522	.564	.622	.686	.758	.659	.759	.621	.399	.526
	Third Docket	.505	.570	.611	.698	.739	.662	.765	.630	.400	.531
	Fourth Docket	.513	.562	.612	.678	.746	.665	.762	.621	.395	.532
	Fifth Docket	.515	.556	.616	.681	.760	.667	.770	.629	.400	.532
	Average for Five Dockets	.513	.564	.614	.685	.752	.664	.763	.626	.398	.531

@ Results of Simulation of 50 cases.

Number of Jurors in Jury Pool for Voir Dire		120	110	100	90	80	70	60	50	40	30
Number Sent Home After Voir Dires		64	54	44	34	24	14	4	0	0	0
Duration of:	First Docket	8125	7922	8412	7922	9003	8538	9003	12761	17664	17664
	Second Docket	7952	8218	8262	8218	8874	8794	8874	12872	17687	17687
	Third Docket	8107	8609	8408	8609	9036	9197	9036	13402	17735	17735
	Fourth Docket	7953	8672	8264	8672	8878	9268	8878	13285	17489	17489
	Fifth Docket	7935	8362	8252	8362	8838	8953	8838	12936	17580	17580
Total For Five Dockets		40072	41738	41598	41783	44629	44750	44629	65256	88155	88155
Utilization of Jury Pool For:	First Docket	.968	.936	.961	.974	.896	.929	.959	.754	.704	.939
	Second Docket	.974	.931	.954	.966	.908	.946	.948	.761	.700	.933
	Third Docket	.9615	.929	.931	.978	.903	.950	.982	.765	.700	.933
	Fourth Docket	.975	.907	.948	.977	.895	.914	.955	.757	.708	.944
	Fifth Docket	.984	.922	.951	.960	.917	.942	.962	.763	.708	.944
Average for Five Dockets		.9713	.975	.949	.971	.904	.936	.961	.760	.704	.939

@ Results of Simulation of 50 cases.

CALCULATIONS NECESSARY TO ARRIVE AT THE AVERAGE UTILIZATION -  
MULTIPLE VOIR DIRE APPROACH

The average contents of Queue 9 equal the percentage of the total duration of the simulation which the voir dires represented. For example, in the first simulation using 120 jurors in the jury pool, the average contents of Queue 9 was 0.119.

This percentage multiplied by the total duration of the simulation represented the duration of the voir dires. The remainder of the total duration represented the duration of trials. In the case of the first simulation with 120 jurors in the jury pool, the duration of the simulation was 8125 minutes. Thus, the voir dire portion lasted  $0.119 \times 8125$  minutes. The trial portion lasted  $0.881 \times 8125$  minutes.

The average contents of storage 1 represented the average number of jurors in the jury pool not being used throughout the simulation. The average contents of storage 1 in the example was 2.415 jurors. Thus, the total number of juror-minutes of waiting time was  $2.415 \times 8125$  juror-minutes.

The total number of juror-minutes required for the voir dire portion of the first docket was  $8125 \times 0.119 \times 120$  when 120 jurors were in the jury pool.

Since some jurors were sent home after the completion of the voir dires, the total number of juror-minutes required for the trial portion of the first docket was  $8125 \times 0.881 \times 56$ . At the completion of the voir dire portion, 64 of the 120 jurors were sent home, leaving 56 jurors at the court.

Therefore, the percentage of non-utilization was found to be:

$$\begin{array}{lcl} \text{Percentage} & & \\ \text{Juror} & = & \frac{\text{Juror-Minutes Spent in the Jury Pool}}{\text{Total Juror-Minutes Required for the Voir Dires and Trials}} \\ \text{Non-Utilization} & & \end{array}$$

or for example:

$$\begin{array}{lcl} \text{Percentage} & & \\ \text{Juror} & = & \frac{8125 \times 2.415}{(8125 \times 0.119 \times 120) + (8125 \times 0.881 \times 56)} = 3.2\% \\ \text{Non-Utilization} & & \end{array}$$

Therefore, juror utilization would be 100 percent minus 3.2 percent or 96.8 percent in the simulation of the first docket with 120 jurors available for the multiple voir dires.

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## VITA

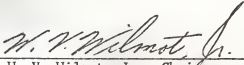
Michael John White was born December 17, 1944 in Lansing, Michigan. He graduated from Resurrection High School in 1962.

He was a student in the Cooperative Plan at General Motors Institute. His sponsor for the program was Oldsmobile Division of General Motors Corporation. He completed the five-year program and was awarded the Bachelor of Electrical Engineering degree from GMI in 1967. In Spetember, 1967 he entered the Graduate School of Business Administration at Michigan State University and was awarded a Master of Business Administration degree in August, 1968.

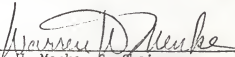
In January, 1969 he began his doctoral studies at the University of Florida.

The Ph.D. dissertation was written while the candidate was Assistant Professor of Management at the University of South Florida, Tampa, and St. Petersburg, Florida. He joined U.S.F. in 1968 as an Instructor and was promoted to Assistant Professor in September, 1970.


I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

  
Dr. W. V. Wilmot, Jr., Chairman  
Professor of Management

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Dr. W. W. Menke, Co-Chairman  
Associate Professor of Management

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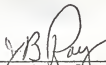
  
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J. B. Ray, J.D.  
Associate Professor of Business Law

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\_\_\_\_\_  
Dr. E. L. Jackson  
Professor of Economics

This dissertation was submitted to the Department of Management in the College of Business Administration and to the Graduate Council, and was accepted as partial fulfillment of the requirements for the degree of Doctor of Philosophy.

December, 1972

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Dean, Graduate School